

Reducing Greenhouse Gas Emissions and Increasing Transportation Choices for the Future

11/05/08

Introduction

Emissions from transportation-related activities account for nearly half of the total greenhouse gas (GHG) emissions in Washington. Achieving significant reductions in transportation-related GHG emissions is critical for Washington and it will require meeting its short and long term vehicle miles traveled (VMT)¹ benchmarks.

At the same time, there is a transportation funding crisis in Washington that requires urgent action. The challenge facing the state is implementing appropriate strategies to reach Washington's GHG emission reductions and VMT reduction benchmarks while addressing the impacts of the current revenue shortage on state and local transportation infrastructure and operating expenses and on the ability of transit agencies to provide appropriate levels of service. This challenge is compounded by the paradox that transportation funding is dependent on the gas tax; as the state achieves progress in reducing the amount of miles traveled, the funding available to provide appropriate levels and quality of transportation service throughout will further diminish.

The Transportation Implementation Working Group (IWG)² recognized an opportunity to reconceptualize transportation in Washington. The Transportation IWG was formed under the Climate Action Team (CAT) to address the ESSHB 2815 requirements regarding "most promising" GHG reduction strategies and VMT reduction strategies for transportation.³ To work towards collaborative solutions, the Washington State Department of Transportation (WSDOT) combined its responsibilities in Section 8 of ESSHB 2815 with the CAT effort, expanding the charge to the Transportation IWG to include recommended tools and best practices to achieve the VMT-reduction benchmarks.

This collaborative report represents the recommendations of the Transportation IWG that were developed using a consensus process, and is intended to meet WSDOT's requirement to report back to the legislature based on the direction of ESSHB 2815. Through these recommendations, the Transportation IWG seeks to move Washington towards a future travel environment where citizens can choose public transportation,⁴ walking, bicycling, or ridesharing for their daily activities; a future transportation system that supports transportation choices that are environmentally-friendly, easier to use, more reliable, safer, and less expensive for the user than the current system; and future funding decisions that support and encourage reductions in GHG and VMT, further Washington's economic competitiveness and minimize expenditures on imported fuels. The ultimate goal is to build, operate and maintain a transportation infrastructure that is efficient and effective at moving people and goods. To achieve this vision, Washington must reexamine how investments in transportation infrastructure and services are made at all

¹ As referred to in ESSHB2815 vehicle miles traveled (VMT) is the number of miles that vehicles less than 10,000lbs are driven. VMT is a surrogate for GHG emissions from the transportation sector. Reducing VMT per person reduces emissions and improves the overall efficiency of the transportation system.

² The Transportation IWG Scope is at:

http://www.ecy.wa.gov/climatechange/2008CATdocs/iwg/tran/050908_tran_scope.pdf

³ For the more information on the overall CAT process and final recommendations, see the 2008 CAT report, *Leading the Way: Implementing Practical Solutions to the Climate Change Challenge*.

⁴ The term "public transportation" in this document refers to all non-single occupancy vehicle transportation options. "Transit" refers specifically to motor bus services, unless otherwise indicated. "Ridesharing" refers to carpool and vanpool services.

levels of government. Washington State should make funding decisions and pursue revenue generating strategies that stimulate behaviors that support climate change solutions and that discourage behaviors that contribute to the problem.

The Transportation IWG is proposing short and long-term VMT and GHG-reduction strategies that must be implemented immediately and coordinated to account for long-term changes in behavior. A portfolio of strategies is needed that evolves over time as the transportation infrastructure becomes available and as demand shifts, with strategies tailored to meet different types of users. Recognizing different user types (e.g. large urban, small urban, and rural) in the design and timing of strategies is an important component of maximizing their effectiveness.

To reduce VMT, with the ultimate goal of reducing GHG emissions, the Transportation IWG is recommending a package of strategies that fall into three broad categories, but which are synergistically more beneficial when integrated and implemented in conjunction with each other:

- Transit, Ridesharing, and Commuter Choice Programs, including recommendations to expand and enhance current programs to increase viable transportation options available to Washington residents to conduct the activities, trips, and travel needed and desired for daily life.
- Compact and Transit Oriented Development (CTOD) and Bicycle and Pedestrian Accessibility that supports the development of compact walking, bicycling, and public transportation-friendly communities and to increase the travel choices available.
- Transportation Funding and Pricing Strategies that identify and create potential pricing mechanisms to support and incentivize GHG and VMT reductions, and stress key considerations for revenue use to support transportation infrastructure maintenance and operations.

Given the need for a scalable multi-pronged approach to address the climate impacts of the transportation sector, the Transportation IWG has also defined and advanced specific non-VMT transportation policy proposals, including recommendations related to freight railroads; diesel engine emission reductions and fuel efficiency; vehicle electrification; and a low carbon fuel standard.

The recommendations of the Transportation IWG are described in the following five sections. Background and supporting detail for each area are followed by the specific recommendations and supporting actions.

I. Expanding and Enhancing Transit, Rideshare, and Commuter Choice

By 2035, Washington's transportation system will:

- Enable users to make transportation choices that are environmentally-friendly, easier to use, more reliable, safer, and less expensive than the current system.
- Make single vehicle households an attractive option.
- Be driven by targeted investments that reduce VMT by at least 30 percent⁵ and lowers GHG emissions at least 25 percent below 1990 levels.

In this travel environment citizens will choose public transportation, walking, bicycling, or ridesharing⁶ for their daily activities.

The Transportation IWG is proposing a set of Transit, Rideshare, and Commuter Choice recommendations that, if implemented in conjunction with the CTOD and Transportation Pricing recommendations (See section II and IV, respectively), will enable Washington State to realize this vision.

The Transportation IWG recommendations to expand and enhance transit, rideshare, and commuter choice are development of a Washington State Transportation Access Network (WSTAN), enhancements to existing urban Commute Trip Reduction (CTR) and rideshare programs, and implementation of a statewide Residential Trip Reduction⁷ (RTR) program. The implementation of these three programs must be tailored to meet the demands of three different types of users: Large Urban, Small Urban, and Rural. Recognizing these different user types in the design and timing of strategies is an important component of maximizing their effectiveness. Successful implementation also requires a coordinated effort between Regional Transportation Planning Organizations (RTPOs), cities, counties, WSDOT, Transit Agencies, and transportation stakeholders.

These three recommendations are complimentary and should be implemented concurrently. The WSTAN would be a statewide effort to assure public transportation infrastructure is coordinated and exists where appropriate. The enhancements to the CTR and Rideshare programs benefit from the existence of a WSTAN and assume some urban commute trips will use the WSTAN, but focus on reducing the number of SOV urban commute trips by promoting alternative work arrangements and ridesharing. The RTR Program is an attempt to reduce the number of residential, also known as non-commute, trips statewide. These residential trips account for a majority of trips taken statewide and any meaningful reduction of VMT must include fewer SOV residential trips. Success of the RTR Program is tied, in part, to the success of the WSTAN in providing a viable means of transportation.

The Transportation IWG recommends that the WSDOT, in conjunction with MPO's, transit agencies, and others, work to improve the reporting and estimating of VMT and GHG using regional transportation modeling tools to better understand the impact of various strategies and their interactions. The Transportation IWG has identified targets for each commute mode. The purpose of these targets are to enable effective monitoring of the strategies to ensure that progress is being made to achieve the VMT benchmarks and the overall greenhouse gas limits.

⁵ 30% decrease in VMT is consistent with the benchmarks in WA ESSHB 2815

⁶ "Transit" refers specifically to motor bus services, unless otherwise indicated. "Public transportation" refers to all non-single occupancy vehicle transportation options. "Ridesharing" refers to vanpool and carpool services.

⁷ The RTR Program represents non-commute trips.

Through frequent monitoring, changes can be made to the implementation to allow a continued focus on the targets.

Washington State Transportation Access Network

The WSTAN would be a deliberate and coordinated strategy to assure that public transportation provides vital transportation connections to enable travel throughout Washington and provide affordable alternatives to a car-dependent lifestyle. The most significant component of the WSTAN is a statewide approach to transit. However, to significantly reduce VMT and GHG emissions in Washington State, the majority of people in Washington State will need to live and work in places that both support bicycling and walking for shorter trips and provide reliable and convenient public transportation that meets mobility needs for longer trips. Given the diversity of land use and transportation demands in Washington, the WSTAN will have different characteristics in the various transportation operating environments throughout Washington.

Primary Markets for Public Transportation in Washington

Reduction of VMT will be the most achievable in denser areas of Washington that have land use and development patterns which support bicycling, walking and public transportation use and also have a higher proportion of statewide VMT. Although typically associated with urban areas, some rural areas have small, yet dense areas of development as well. Investments in public transportation are most effective in areas that have a population density of over 3,000 people per square mile. WSTAN operating environments are defined as follows:

Best WSTAN Operating Environments exist where the population per square mile exceeds 4,000 people. In areas such as these, locations are generally close together, pedestrian infrastructure often exists or could be improved to create connections, and there is often a diversity of land uses. All of these attributes contribute to a successful environment for transit. Land use changes and development patterns that support bicycling and walking can have the most impact in these areas. These areas also warrant the most significant investments in transit, including all-day service, as there is the highest potential to reduce dependence on single occupant vehicle (SOV) travel.

Good WSTAN Operating Environments exist where the population per square mile is between 3,000 and 3,999. These areas share many of the characteristics described in the best WSTAN operating environments, but have lower density. These areas should be the focus of infill and smart growth initiatives to improve the ability of transit to serve these markets.

Less Optimal WSTAN Operating Environments exist where the population per square mile is between 2,000 and 2,999. These areas are generally not dense enough to support transit as a primary mode of public transportation. Even though there is not a sufficient level of demand to provide all-day service, people still need to be able to access transit for some of their travel needs. Service in these types of areas should occur several times a day to allow people to make necessary connections. Increasing density of these areas should also be a focus, particularly for places that are close to the good WSTAN operating environment threshold of 3,000 people per square mile.

Least Optimal WSTAN Operating Environments: exist where the population per square mile is less than 1,999. These areas are the least able to support transit as a mode of transportation. A potential successful alternative to transit would be ridesharing programs.

The population of Washington State is distributed as follows in these WSTAN operating environments:⁸

	Best WSTAN Operating Environment	Good WSTAN Operating Environment	Less Optimal WSTAN Operating Environment	Least Optimal WSTAN Operating Environment	Total
Urban (More than 50,000 people)	849,940	788,440	545,595	52,290	2,235,265
Suburban/Small Urban (Between 10,000 and 49,999 people)	20,930	373,370	577,090	325,440	1,296,830
Rural (Between 1,500 and 9,999 people)	20,890	18,265	180,640	256,914	476,709
Total	890,760	1,161,810	1,303,325	634,644	3,990,539

Over half of Washington State's population that live in cities over 1,500 already live in a best or good WSTAN operating environment.

Transit Elements of the Washington State Transportation Access Network

Depending on the travel market, statewide transit can be provided contextually, as an array of clearly defined services that allow travelers to determine how best to make their trips. These choices will be made in a similar way that drivers consider the tiered system of streets and highways as they choose a route that best connects them to their destination. The Washington State Transportation Access Network Map in Exhibit 1 (page 11), with insets in Exhibits 2 and 3, provides a visual description of these service options:

- **Intercounty Service:** Numbered in the 400s and shown in yellow on the map, these services provide rapid, long distance connections between cities and county seats with a population of more than 1,500 in rural areas of Washington that are not located within a short distance to a large urban area with other service connections. Service will be provided at least three times a day, seven days a week.
- **Regional Service:** Numbered in the 500s and shown in blue on the map, this service will connect major destinations in a metropolitan area, typically in suburban and urban areas. Service will be offered every 30 minutes or less, for 15 hours a day, every day. Stops could be as far as 10 miles apart on limited access corridors, and one to two miles elsewhere.
- **Rapid Suburban/Urban Service:** These routes are Bus Rapid Transit (BRT) routes that generally operate on limited access corridors and serve urban and suburban destinations within an urbanized area with stops between one-quarter and one mile apart. These routes will operate at a minimum of every 15 minutes for 18 hours a day, seven days a week.
- **Local Urban Service:** Underlying the longer-distance, faster routes, a robust local network will connect more places. This network will frequently connect to the specialized express, regional and intercounty services, and augment high-demand peak-hour express service to employment centers. This local service, numbered in the 700s and shown in green on the map, will be provided in urban areas with a minimum of 10 minute headways, 18 hours a day, every day.

Additional services include community connectors that provide local service and rural connections, and specialized peak hour express service to serve commute markets. These types

⁸ Office of Financial Management, 2008. *Population, Land Area and Density for Cities and Towns*, Apr 1. Accessed from <http://www.ofm.wa.gov/popden/default.asp>.

of services are not described as part of the Transportation Access Network but are important supplementary local services that will contribute to the overall success of the Transportation Access Networks. When taken together with bicycling, walking, alternative commute, and ridesharing, the services that make up this Transportation Access Network provide a web of integrated mobility options that will allow people to better meet their mobility needs with transit.

How the Washington State Transportation Access Network will Reduce GHG Emissions

Since transportation accounts for nearly half of the GHG emissions in Washington State, any effort to mitigate the effects of climate change must include a focus on the transportation sector. All trends point to a continued rise in transportation emissions as population and employment increase, and if land use patterns continue to favor automobile travel to access jobs and other needs of daily life. A reduction in transportation-related GHG emissions will require significant changes in how we live, travel, and think about mobility, addressing not just GHG emissions per mile, but also the number of VMT.

In order for significant GHG emission reductions to occur, transit, ridesharing, bicycling, and walking must become the modes of choice for more of our travel needs. Land use patterns that facilitate these modes of travel, combined with an enhanced fleet of energy-efficient transit vehicles, are essential components of a public transportation system that will ultimately contribute to GHG reductions. This public transportation system must be attractive and a viable choice for people by providing adequate speed, access and frequency. The WSTAN, in combination with an increased focus on sustainable, compact development and other modes of transportation, will provide the necessary infrastructure to make non-car travel practical for most residents in Washington State.

System Design of the Transportation Access Network

Daily per capita VMT in Washington is estimated to be 31 miles in 2008. ESSHB 2815 specifies a reduction of per capita VMT of 30 percent by 2035, which translates to daily VMT per capita of 22 miles in 2035. The proposed WSTAN achieves this reduction by implementing two sets of improvements to the public transportation system.

First, the system would be designed to increase service dramatically within all areas, with a particular emphasis on those areas that can best support transit. For example, the percent of high density urban trips occurring on transit increases from 9 percent to 22 percent with similar increases in other non-SOV and high occupancy vehicle (HOV) modes. SOV decreases from 39 percent to 26 percent of the trips.

The following table presents the mode share assumptions for 2035.

Mode Share by Density and Urbanization, 2035						
Density	Urbanization	Transit	Walk	Other	HOV	SOV
High	Urban	22%	16%	14%	22%	26%
Good	Urban	20%	16%	10%	24%	30%
Less Optimal	Urban	7%	15%	15%	26%	37%
Least Optimal	Urban	3%	7%	8%	34%	48%
High	Suburban	20%	16%	14%	22%	28%
Good	Suburban	15%	20%	20%	20%	25%
Less Optimal	Suburban	3%	8%	8%	25%	56%
Least Optimal	Suburban	2%	8%	8%	18%	64%
High	Rural	13%	12%	10%	35%	30%

Good	Rural	10%	17%	15%	28%	30%
Less Optimal	Rural	2%	6%	7%	20%	65%
Least Optimal	Rural	2%	6%	7%	20%	65%

Second, population is assumed to be concentrated in those areas that are most supportive of transit. Thus, trip growth occurs overwhelmingly in urban high-density areas and much less so in low-density rural areas.

These two sets of assumptions provide the basis for meeting the VMT-reduction benchmarks in ESSHB 2815. The following table presents the mode split for all trips—commute and non-commute—that would occur on each mode to meet the VMT-reduction benchmarks of ESSHB 2815:

Washington State Estimated Current and Projected Mode Split and Per Capita Miles, 2008 and 2035						
	Current		Status Quo, 2035		Proposed Scenario	
	Trips	% by Mode	Trips	% by Mode	Trips	% by Mode
Transit (Including commuter rail)	575,000	3.7%	690,000	3%	2,813,000	13.1%
Walk	1,188,000	7.5%	1,621,000	8%	2,930,000	13.7%
Other	774,000	4.9%	1,056,000	5%	2,561,000	12.0%
HOV	4,475,000	28.4%	6,112,000	29%	4,889,000	22.9%
SOV	8,738,000	55.5%	11,914,000	56%	8,200,000	38.3%
Total Trips	15,750,000	100.0%	21,393,000	100%	21,393,000	100.0%
VMT (SOV + HOV) per capita	31				23	

These reductions are consistent with the public transportation environment currently found in many major metropolitan areas. For example, in Copenhagen, transit accounts for 33 percent of trips, with 36 percent on bikes, 5 percent walk, and 27 percent of trips by automobile.⁹ Though this city has a long history of transit use and a focus on alternative modes of transportation, especially bike and walk, there are more localized examples. In Vancouver 11 percent of trips are by transit and 13 percent by bike and walk. Nearly a quarter of current trips are not by car, and as land uses change and transportation improves, it is expected that the number will increase. The City of Seattle's Transportation Plan lays out a goal reducing SOV use. By 2010, the goal is to have 48 percent of trips in cars, 27 percent on transit, and 19 percent by bicycle and walking.¹⁰

Recommendations

The Washington State Transportation Access Network, if implemented in conjunction with the CTOD and Transportation Pricing recommendations (See section II and IV, respectively), sets forth a means and an idea to achieve the VMT-reduction benchmarks identified in ESSHB 2815.

⁹ Nelson, Alysse, 2008. Livable Copenhagen: The Design of a Bicycle City. Accessed from: http://www.sightline.org/research/sprawl/res_pubs/Livable_Copenhagen_reduced.pdf

¹⁰ Department of Planning and Development, City of Seattle. Mode Split Targets for Urban Centers. Accessed from:

http://www.cityofseattle.net/dpd/stellent/groups/pan/@pan/@plan/@proj/documents/Web_Informational/dpd_001015.pdf.

If implemented, Washington would become like other locations around the world that are renowned for their good public transportation. Achieving the targets in ESSHB 2815 requires a coordinated approach to land use and public transportation. By targeting public transportation improvements to the best operating environments, significant GHG emission and VMT reductions can be achieved.

There are barriers that would need to be overcome. Implementing a public transportation system of this scope and scale would be a difficult undertaking. Coordination with local jurisdictions and among statewide agencies to promote consistent branding and types of services would require a significant amount of oversight and collaboration. In addition, ensuring that land use patterns, development, and laws contribute to and improve the WSTAN would require statewide buy-in and support. The following are specific barriers to implementing the Washington State Transportation Access Network and specific recommendations to overcome them:

Washington State Transportation Access Network Recommendation 1

Barrier: Operating Costs/Cost Efficiency

Recommendations:

- Request WSDOT and General Administration, in conjunction with the Washington State Transit Association (WSTA), to explore state purchasing contract for transit buses.
- Provide statewide guidance/assistance on types of buses to purchase with the potential to offset the 35 percent cost premium of hybrid buses.
- During fleet replacement planning, local transit agencies should identify the incremental increase in expenses to migrate the infrastructure to cleaner-technologies, including maintenance and base capacity. The incremental cost of choosing the cleaner technologies may be offset by a state funding program.
- Expand the definition of Renewable Energy Credits (under Initiative 937) to include connection to local transit system with a focus on migration to hybrid or electrification of system.
- Prioritize the energy efficiency block grants for transit projects by including a statewide policy statement for a prioritization of uses.
- Develop WSDOT policy that recommends Federal Transit Administration to resume the bus research program.

Washington State Transportation Access Network Recommendation 2

Barrier: Recruitment and Retention of Drivers and Mechanics

Recommendations:

- Under authorization from ESSHB 2815 (Section 9), WSDOT should serve as the lead organization and coordinate with the Employment Security Department to perform labor market research to establish a job training grant program for transit operators, mechanics, and transit planners, and assure these professions are included in the green jobs definition.
- Establish a center of excellence at a community college for transit operators, schedulers, mechanics, and planners.
- Request King County Metro to develop a module on how to use federal funding such as the Job Access and Reverse Commute Program to recruit and train operators and mechanics from low income communities.

Washington State Transportation Access Network Recommendation 3

Barrier: Maintenance/base facilities at capacity and/or are outdated

Recommendations:

- Allow transit agencies to use design/build procedures to construct transit facilities.

- Request WSTA to explore current status of efforts to expedite permitting process for essential public facilities.

Washington State Transportation Access Network Recommendation 4

Barrier: Park and Ride lot capacity

Recommendations:

- Provide incentives to move vanpool and carpoolers away from park and ride lots served by transit to park and pool locations.
- Develop more park and pool and lease lots.
- Develop traveler information for park and rides at state-owned facilities, e.g., roadside signs that show the number of available spaces.

Washington State Transportation Access Network Recommendation 5

Barrier: Congestion on the transit network (degrades service efficiency and eliminates any travel time advantage)

Recommendation:

- Explore bus only lanes, queue jumping, signal prioritization, and opportunities to increase HOV capacity direct access.

Washington State Network Recommendation 6

Barrier: Ineffective intermodal connections

Recommendation:

- Encourage WSTA to sponsor a strategic planning and scenario planning session to Propose additional investments to improve intermodal connections in support of the WSTAN.
- Create a program that provides matching funds to local governments to enhance non-SOV intermodal connections, e.g., bicycling amenities, to improve access to the WSTAN.

Washington State Network Recommendation 7

Barrier: Routes and service confusing/intimidating to new users

Recommendation:

- Improve marketing and outreach for first-time users through CTR and Growth and Transportation Efficiency Centers¹¹ (GTEC) residential-based individualized marketing efforts.
- Identify a role for Washington's software industry in providing real-time information to transit agencies (to assist in bus flow and movement) and customers (for routes, connection, availability, etc.).

¹¹ A GTEC is a defined boundary of dense mixed development with major employers, small businesses and residential units, within an established urban growth area. The goal of the GTEC program is to provide greater access to employment and residential centers while decreasing the proportion of commuters driving alone during peak periods on the state highway system. GTECs are intended to more closely integrate the local jurisdiction land use and transportation planning, as well as requiring a stronger partnership with local transit agencies.

Exhibit 1: Washington State Transportation Access Network Map



WSTAN service numbered in the 700s provide access to most urban neighborhoods of the state. Service is every 10 minutes or less, 18 hours a day, 7 days a week. Stops are about every quarter-mile.



WSTAN service numbered in the 600s provide access to many urban and suburban destinations throughout the urbanized areas of the state. Service is every 15 minutes or less, 18 hours a day, 7 days a week. Stops are between one-quarter and one mile apart.



WSTAN service numbered in the 500s connect urban centers and major destinations scattered throughout a metropolitan area. Service is every 30 minutes or less, 15 hours a day, 7 days a week. Stops can be as far as 10 miles apart on limited access corridors, and one-half to two miles elsewhere.



WSTAN service numbered in the 400s connect every county seat and city of 1500 population and over within a short distance to a large urban area with other rural and regional destinations. Service is at least three times per day, seven days a week.

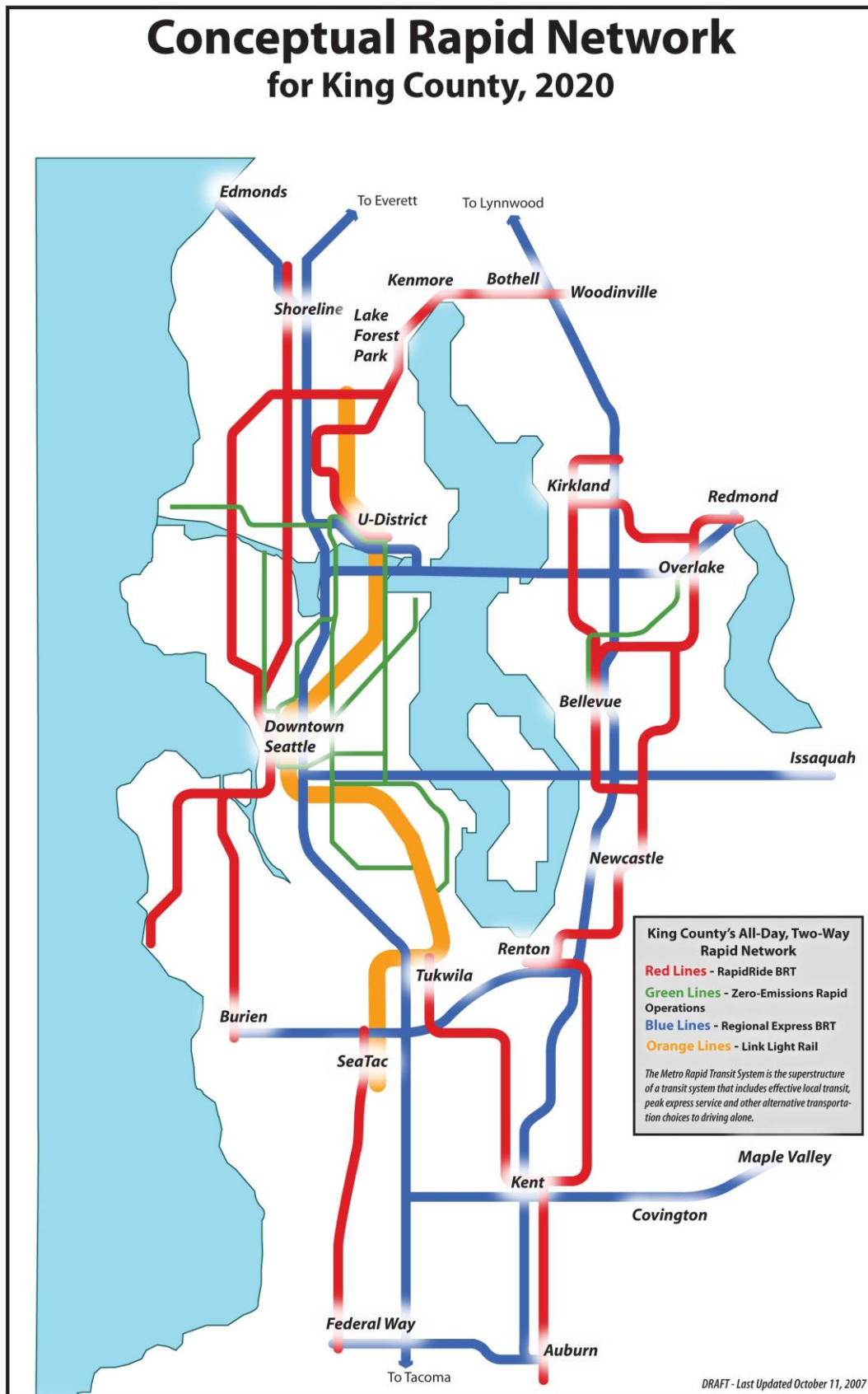
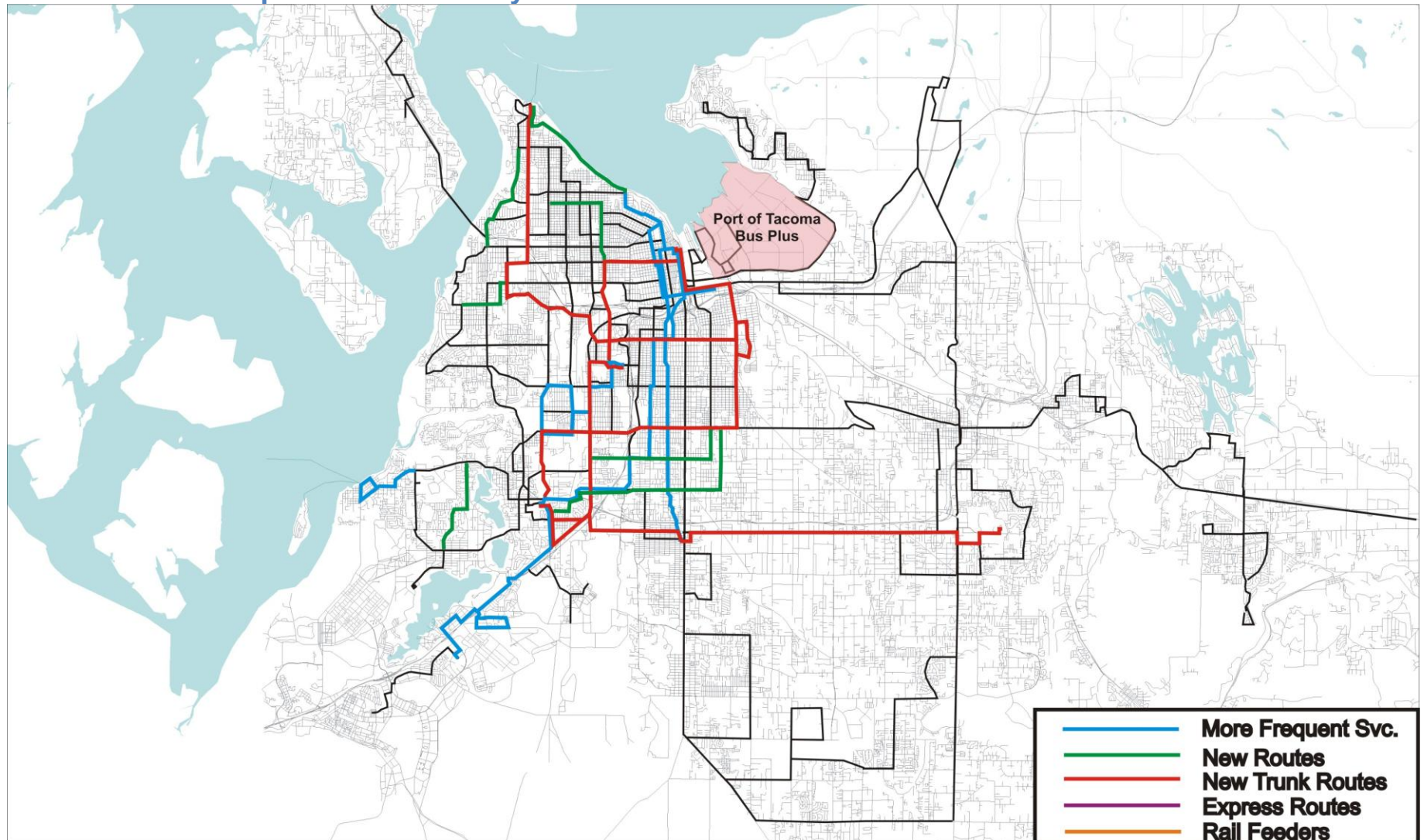
Exhibit 2: Inset Map 1—King County

Exhibit 3: Inset Map 2—Pierce County

Enhancements to Urban Commute Trip Reduction and Rideshare Programs

This strategy focuses primarily on urban commute trips. It emphasizes, expanding the number of commute trips by vanpool, carpool, and telework, and implementation of compressed work week (CWW) schedules statewide. Supply-side investments in vans and “park and pool” capacity and demand-side investments in ride matching technology, outreach and incentive programs (such as CTR, GTEC, and residential-based trip reduction) would support growth in all commute options. Ridesharing (includes vanpool and carpool), telework, and CWW schedules are the most cost-effective and quickest strategies to implement. Ride matching and residential-based trip reduction programs support reductions in drive-alone trips for non-work purposes. This strategy builds the assumption that demand for non-SOV trips will increase due to successful implementation of CTOD strategies and implementation of pricing on major road networks. Enhancements to CTR and rideshare programs complement the WSTAN; the changes in travel behavior captured in the mode splits described for the WSTAN assume successful shifts away from SOV for commute trips.

Description of Current Urban CTR and Rideshare Programs

The state, transit agencies, local governments, employers, and other partners already invest in demand management strategies, primarily for work trips. These investments include ridesharing, Rideshareonline.com (the on-line ride matching service), outreach and incentive programs to major employers in congested urban growth areas and smaller employers and residents in seven downtown areas of the state, and RTR programs in Bellingham and King County. The state and transit agencies also own and operate park and ride lots throughout Washington.

Implementing Program Enhancements

The goal of this strategy is to rapidly implement comparatively low cost strategies to increase the number of commute trips made by ridesharing and decrease the overall number of commute trips that occur through CWW and teleworking, to quickly produce effective reductions in SOV trips and VMT per capita.

Table 1 shows the projected growth in new daily passenger commute trips if only the Transportation Pricing and CTOD recommendations are implemented. Table 2 shows the projected growth in new daily passenger commute trips if when a rideshare strategy is implemented with the Transportation Pricing and CTOD recommendations.¹² The rideshare strategy assumes a combination of supply and demand side actions, including:

- Expanding the statewide vanpool fleet by 6,600 vehicles by 2035.
- Upgrading and promoting Rideshareonline.com to match more commuters into carpools and vanpools.
- Investing in park and pool (leased) lots to add more spaces for commuters to park and match up with their pools in the morning.
- Expanding state support for telework with toolkits, outreach, and technical assistance.
- Implementing a statewide marketing campaign to provide information, incentives and tools for commuters to choose commute options, integrating promotion of Rideshareonline.com and traveler information for park and pools.
- Enhancing and expanding the CTR, GTEC, and residential-based trip reduction strategies to deliver the statewide information and incentives campaign to commuters at major employers and downtown areas, as well as at their homes.
- Creating a VMT innovation grant program to fund creative ideas to reduce VMT.

¹² The trips and mode splits in Tables 1-3 represent only commute trips. These figures reflect only portion of the total number trips described in the supporting figures for the WSTAN.

Table 1- Projected Growth in New Daily Passenger Trips in Washington, Assuming Implementation of Pricing and Land Use Recommendations Only (Plus baseline)

New Daily Passenger Trips	Commute			
	2011	2015	2020	2035
Vanpool	8,300	10,500	12,700	16,300
CWW	4,900	11,500	17,900	30,500
Telework	7,200	17,000	26,300	44,900
Bus (including rail)	12,700	283,100	321,500	448,600
Carpool	110,600	140,700	169,600	217,300
Walk	44,900	64,900	84,400	118,800
Bike	40,100	49,700	60,000	83,800
Total non-drive alone daily trips	228,700	577,400	692,400	960,200
Vanpool Vehicles	1,000	1,300	1,500	2,000

Table 2- Projected Growth in New Daily Passenger Trips in Washington. Assuming Implementation of Transportation Pricing, Land Use and Rideshare Recommendations (Plus baseline)

Strategy Driven	Commute			
	2011	2015	2020	2035
Vanpool	18,400	35,300	45,400	54,300
CWW	9,600	22,500	33,400	49,800
Telework	9,800	24,200	38,100	65,800
Bus (Including rail)	245,300	299,200	348,700	485,500
Carpool	142,296	213,100	249,300	299,900
Walk	51,400	80,800	102,900	138,900
Bike	46,600	65,700	78,400	103,900
Total non-drive alone daily trips	523,396	741,000	896,200	1,198,100
Vanpool Vehicles	2,200	4,300	5,500	6,600

Table 3- Mode Splits assuming implementation of Transportation Pricing, Land Use, and Rideshare Recommendations (Plus baseline)

New Daily Passenger Trips	Commute				
	2006	2011	2015	2020	2035
Drive Alone	74.8%	61.2%	58.7%	57.8%	56.6%
Vanpool	0.5%	1.3%	1.4%	1.5%	1.5%
CWW	2.2%	2.3%	2.5%	2.6%	2.6%
Telework	3.2%	3.3%	3.4%	3.5%	3.6%
Bus (including rail)	7.9%	14.4%	14.8%	14.9%	16.0%
Carpool	6.7%	10.3%	11.4%	11.5%	11.1%
Walk	3.1%	4.4%	4.8%	5.0%	5.2%
Bike	1.6%	2.8%	3.1%	3.2%	3.4%

Cost Estimates

(all costs in 2008 dollars)

- Vanpool capital - \$171 million to purchase 6,600 vehicles by 2035.
- Vanpool operating—The estimated gap between costs and revenues for the new vans is \$1700s. Assuming this gap goes forward through 2035, the annual cost of operations not covered by fares and other revenues for the new vans would be \$11 million by 2035.
- Rideshareonline.com—costs include outreach and promotion of the system, upgrades to the system in 2009-2011 and 2017-2019:
 - 2009-2011: \$1.7 m
 - 2011-2015: \$3.4 m
 - 2015-2020: \$5.7 m
- Park and ride/park and pool—annual cost of providing roughly 170,000 to 350,000 leased park and pool spaces in 2035 to support expanded vanpooling and carpooling is between \$11 million and \$21 million (\$60 per space per year).
- Statewide technical assistance, promotions and outreach:
 - Umbrella campaign - \$3 per household per year, approximately \$8 million per year in 2009-2011
 - CTR and GTEC –\$9 million/year in 2009-2011 and \$12 million/year in 2019-2021
 - Residential-based TDM - \$500,000 in program development costs, ongoing cost is approximately \$20 per household per year or approximately \$54 million per year in 2009-2011
 - VMT innovation grants—scalable at roughly 4.3 cents per vehicle mile reduced

Recommendations

The following are specific barriers to implementing this urban CTR and ridesharing strategy. Many of these barriers are a result of limited funding. Recommendations to overcome these barriers include a mix of funding ideas, staff work, and policy work.

Enhancements to Urban Commute Trip Reduction and Rideshare Programs Recommendation 1

Barrier: Lack of funding. The primary growth constraint faced by vanpool operators is a lack of funding to significantly expand maintenance facilities and staff support, including mechanics and vanpool coordinators, and to sustainably fund maintenance, administration, and capital replacement as fleet expands.

Recommendations:

- Perform a statewide analysis of the vanpool program to identify possibilities for efficiencies and economies of scale for maintenance and program delivery. As part of the analysis, document best practices in fare structures, cost recovery models and agency budgeting for vanpooling.
- Convene the general managers of the transit agencies to discuss best practices and encourage changes that allow for expansion. Require that transit agencies adopt best practices to be eligible for state-purchased vans to expand their programs.

Enhancements to Urban Commute Trip Reduction and Rideshare Programs Recommendation 2

Barrier: Lack of parking capacity at the origin and destination of a pool. “Park and pool” capacity and worksite parking is limited, and increasingly a barrier as programs expand.

Recommendation:

- Support utilization of existing “park and pool” lots for their intended purposes with traveler information improvements and incentives. Develop partnerships between state and local transit

agencies, and parking providers such as churches and grocery stores, to provide additional “park and pool” capacity statewide.

Enhancements to Urban Commute Trip Reduction and Rideshare Programs Recommendation 3

Barrier: Ineffective ride matching services. RideshareOnline.com was introduced in 2001 to assist commuters in finding and contacting potential vanpool matches. RideshareOnline.com is used and promoted by transit agencies, jurisdictions, Transportation Management Associations (TMAs) and employers in Washington and Idaho. RideshareOnline.com needs to be updated and expanded to incorporate improvements in ride match technology and offer travelers access to better service and better commute management tools.

Recommendation:

- Expand and update RideshareOnline.com to improve travel options for customers and increase effectiveness of rideshare service administrators. WSDOT and its partners have released an RFP to improve RideshareOnline.com, with the goal of having a vendor in place by January 1, 2009 to develop an updated commute management system that combines ride matching, commute tracking, and a web-based incentive distribution system to provide an integrated, streamlined, enhanced and technologically superior commuter/user and administration experience compared with the existing system.

Enhancements to Urban Commute Trip Reduction and Rideshare Programs Recommendation 4

Barrier: Lack of awareness of ridesharing options. Statewide campaigns promoting commute options have been moderately successful, but the legislature has not provided funding for this outreach in recent years. Local campaigns, such as residential-based marketing and employer-based campaigns such as Wheel Options¹³ have proven successful at raising awareness and increasing ridesharing.

Recommendation:

- Launch a statewide awareness campaign to promote all CTR, GTEC, and RTR programs and emphasize the new Rideshareonline.com as a tool for all types of trips.

Enhancements to Urban Commute Trip Reduction and Rideshare Programs Recommendation 5

Barrier: Existing policies. Current land use practices, service orientation, and funding prioritization decisions at the local and regional level may limit the potential to convert drive-alone trips into high occupancy and non-motorized trips.

Recommendation:

- Provide resources and direction to RTPs to gather commute and travel data and work with transit, employers and local governments to identify underserved markets. Use this information to guide partnership creation and investment decisions.

Enhancements to Urban Commute Trip Reduction and Rideshare Programs Recommendation 6

Barrier: Lack of resources. Limited resources exist for state technical support, enhanced CTR/GTEC programs, particularly ridesharing, telework and compressed work week schedules, and broader RTR programs.

Recommendations: Rapidly expand state support for telework with toolkits, outreach, and technical assistance.

¹³ <http://wheeldb.cssnw.com/>

- Re-establish Washington State University (WSU) as a statewide telework technical assistance center for private employers and local governments.
- Monitor and implement the recommendations developed through the Kitsap Telework Project funded in the 2007-2009 biennium
- Emphasize telework and compressed work week schedules in awareness campaigns and outreach to employers. Set goals for state agency worksites.

Statewide Residential Trip Reduction Program

This outreach and incentive strategy is designed to encourage all travelers, not just commuters, to try ways other than driving alone for their trips. A RTR program would use individualized marketing strategies to educate travelers on their options and broaden the state's trip reduction efforts beyond the commute. The RTR is substantially supported by the Washington State Transportation Access Network concept and the ridesharing investments that are part of the enhancements to urban CTR and rideshare programs (see descriptions, above).

Over 75 percent of all trips taken are not for work. In urban areas, many trips are short trips (five miles or less), and over 50 percent of the shortest trips (one mile or less) are made in cars. Changing the way these trips are made requires reaching out to the residents of target communities and engaging them to consider how they can change any of the trips that they make. The approach should be inclusive of all trip types and all potential modes of travel, with the goal of getting people started changing the easy trips first and building on that success.

An example of a successful program is King County's *In Motion* trip reduction program.¹⁴ *In Motion* uses a community-based social marketing model that employs communication, education, pledging and incentives to change individual travel behavior (social marketing campaigns have been piloted in public health and have spread to recycling, energy conservation and other arenas). This program has been implemented in ten communities within King County over the past four years, with an average participation rate of 8 percent to 10 percent of households targeted. Total reported VMT reduced is about 750,000 miles, representing 55,000 trips. A variety of outreach techniques are used to encourage individuals to learn more about their travel options and to incorporate less driving in their daily habits. Individuals who reduce their driving and report on their changed behavior can earn rewards and prizes. Local organizational and business support increases visibility and ownership of the program by target residents. Each program lasts about 3 months, by which time the changed travel behaviors have become somewhat established. Over 90 percent of participants surveyed at the end of the program indicate they are very likely to continue the new travel behaviors.

The *In Motion* program shares common elements with other broad based trip reduction programs: inclusion of all trip types as candidates for change, community identification, inclusion of a pledge and reward system to encourage sustained behavior change, and ongoing communication and education about options and program results.

Statewide Residential Trip Reduction Program Recommendation 1

The Transportation IWG recommends implementation of a statewide RTR program on two levels. State-level support would provide a program brand, and implementation model and tools (such as a website and calendaring system) as a cost-effective way for communities to partner in implementation. Focused implementation within each target community would incorporate community-based messaging, support and outreach, key elements to increasing receptivity of residents and overall participation rates.

A residentially-based trip reduction program could include multiple levels of outreach, such as:

¹⁴ www.kingcounty.gov/inmotion

- Direct mail to each target household.
- Non-traditional outreach such as list serves and blogs.
- Broad promotion regarding the program on a sustained basis (monthly ads, local email newsletters, posters, etc).
- Ongoing communication (email or regular mail) with program participants.

The program would be branded to reflect each target community in which it is implemented. Local business sponsors would be solicited to contribute prizes and other rewards, and mechanisms for identifying participants to their peers would be identified.

Specific information and tools would be provided to residents to help them choose how they can travel differently. Targeting information delivery based on interest will increase overall receptivity, and ultimately behavior change. Examples of key types of information and support include:

- Availability of bus, bike, walk, car share, and rideshare options.
- Assistance on trying new modes—bus, bike and walk buddies.
- Personal trip planning assistance.
- Local accessibility (e.g. bike, walk, bus) maps.

To encourage actual behavior change, a pledge component would be incorporated. This element could be structured in several ways, and combined with rewards and incentives for completing the pledged actions. A trip reporting element would facilitate ongoing encouragement and accounting.

The state could conduct broad outreach to support efforts in target communities on an annual or more frequent basis. A coordinated evaluation would occur in each target community.

GHG Reduction and Net Social Cost of the Transit, Rideshare, and Commuter Choice Program Expansions

Policy	Reductions (MMtCO ₂ e)		
	2012	2020	Cumulative Reductions (2008–2020)
Transit, Rideshare, and Commuter Choices	0.70	2.58	15.5

GHG emission reductions were calculated for these recommendations based on the anticipated reduction in automobile travel and increase in public transportation and rideshare travel. Benefits would be partially offset by an increase in emissions from transit and vanpools. Daily VMT would be reduced¹⁵ by approximately 66.5 million by 2035 as a result of this set of strategies. Daily transit person-miles would increase by 25 million by 2035. The net effect is a reduction of 2.58 million metric tons of carbon dioxide equivalent (MMtCO₂e) in 2020 and 6.10 MMtCO₂e in 2035 (GHG emission reductions were assumed to increase linearly between 2010 and 2035).

Total Costs

The Transportation IWG was not able to complete a full analysis of the net costs¹⁶ of implementing the Transit, Rideshare, and Commuter Choice recommendations. Cost savings from reduced VMT come

¹⁵ Calculated using the assumed mode split changes described in the WSTAN section.

¹⁶ The total net cost of public transportation expansions in Washington State could be estimated according to the following formula: *Cost of investment = (operating, capital maintenance, and capital expansion costs) – (cost savings from reduced vehicle travel)*

primarily from a reduction in the variable costs of owning and operating a vehicle¹⁷ and from a reduction in congestion costs¹⁸. Other external cost savings include a reduction in vehicle crashes, air pollution costs, and parking costs.¹⁹

Capital and operating costs were estimated for each year from 2010 to 2035 for all of Transit, Rideshare, and Commuter choice recommendations except for the WSTAN.²⁰ More study is needed to understand the gaps and resource required to fully implement the WSTAN to accurately estimate costs. Results are shown in the table below. A preliminary analysis has indicated that a substantial net cost savings could result from successful implementation of the Transit, Rideshare, and Commuter Choice recommendations. As these recommendations move forward, it is important to complete this type of analysis to help clarify the total impact of investments in public transportation.

Net Present Value of Total Costs 2010-2035	
Transit (bus and paratransit)	Not Available
Vanpool	\$202,000,000
CTR/GTEC	\$180,000,000
Residential Trip Reduction	\$961,000,000
VMT Reduction Innovation Grants	\$34,000,000
Amtrak	\$4,328,000,000
LRT and Commuter Rail	\$6,684,000,000

¹⁷ Cost components that vary with VMT include fuel, depreciation, and maintenance, and tires.

¹⁸ The reduction in congestion cost could be estimated using the Texas Transportation Institute's (TTI) Urban Mobility Report, which provides comprehensive data on roadway congestion in urban areas. The cost savings reflect the time savings from reduced roadway congestion and the fuel savings from the reduction in congested traveling conditions.

¹⁹ For detail, see: Anderson, David and Gerard McCullough. The Full Cost of Transportation in the Twin Cities Region. University of Minnesota, August 2000. These external costs were not included in the total cost estimate in order to be consistent with the methodology employed by other CAT sectors.

²⁰ Costs were summed and discounted at 5% to obtain a net present value (NPV) in 2006 dollars.

II. Compact and Transit Oriented Development (Including Bicycle and Pedestrian) Recommendations

Compact and Transit Oriented Development (CTOD) is an integral part of this set of Transportation recommendations. CTOD provides the necessary density, infrastructure, and amenities to encourage the use of non-SOV forms of transportation that are in part recommended in this document. Washington's Growth Management Act (GMA) already enables, but does not require, local government planning to promote centers or CTODs.²¹

As part of their deliberations, the Transportation IWG identified some of the transportation-related characteristics of a typical CTOD district, corridor, or node²² including:

- Street facilities for walking and bicycling (sidewalks, bike lanes, or routes).
- High employment *and* residential density development within an identified area or a 10 minute walking circle around a CTOD center which has—or is planned to have - a transit station or transit access, and enough density (at *minimum* 8-10 units/acre²³ area-wide) to support transit service.²⁴ Higher density is preferred in order to create very active, full service CTODs that encourage use of alternative modes and maximize decreased VMT.²⁵
 - This level of density is a goal and requires significant time and investment. Many areas will not achieve this for a period of time.
- Transit access and facilities with headways²⁶ of 15 minutes or less with the most transit intensive areas providing Bus Rapid Transit and High Capacity Transit.
- Street connectivity and traffic calming features to control vehicle speeds (average block perimeter no greater than 1,350 ft.).
- Mixed-use/Mixed-income development that includes retail, commercial/office, various types and affordability levels, and possibly schools in a form that encourages walking and bicycling from one place to another.
- Parking management that results in reduction of the amount of land devoted to parking (no minimum parking standards and full market rates charged for all parking spaces).
- Subsidized housing within CTODs for the poor and otherwise vulnerable constituents who may be displaced during transition to CTOD.
- Bike share and car share opportunities, e.g., Zipcar.
- Building design, street design, and amenities (parks and cultural opportunities) that attract everyone living, working or visiting the area to walk rather than move a vehicle from one place to another, i.e., daycare and grocery facilities near employment centers.

²¹ "Town Centers" are the most likely compact, or compact and transit oriented development that will occur over time in the majority of cities planning under GMA.

²² District, Corridor or Node refer to locally defined and delineated areas where CTOD type growth is targeted.

²³ The 2007 CAT CTOD recommendation was 8-10 net units/acre – total CTOD acreage minus critical areas.

²⁴ Residential densities of at least 7 dwelling units per acre are considered necessary to economically justify use of local bus routes operating 30 minutes headways. As residential density rises to 30 dwelling units per acre, transit use has been found to triple and at 50 units per acre becomes more numerous than auto trips. Likewise, transit ridership increases significantly as employment density exceeds approximately 50 employees per acre or in activity centers having more than 10,000 jobs.

²⁵ Another alternative measure for density is to use gross density. The PSRC publication, "Developing Your Center – A Step by Step Approach," identifies different gross density goals for different types of "centers" (synonymous with CTODs). These included; Regional Center – 20 units/acre, 80 jobs/acre (300,000 jobs); Metropolitan Center – 15 units/acre, 50 jobs/acre (30,000 jobs); Smaller Urban Center – 10 units/acre, 25 jobs/acre (15,000 jobs); Town Center – 7 units/acre, 15 jobs/acre (2,000 jobs).

²⁶ The headway between vehicles in public transit systems is the time between two vehicles passing the same point traveling in the same direction on a given route.

Based on the elements of a CTOD as described above, the Transportation IWG recommends promoting housing and employment density, parking incentives and management, transportation concurrency, bicycle and pedestrian accessibility, and leveraging urban Brownfield development. The Transportation IWG focused on these specific CTOD elements because they represent the most promising opportunities to reduce VMT.

Housing and Employment Density

Dense housing and employment promotes fewer and shorter SOV trips and makes providing non-SOV service more cost efficient.

There are several overlapping and complimentary recommendations with the Land Use and Climate Change (LUCC) Committee. The LUCC recommendations that support the Transportation IWG Housing and Employment Density recommendations include:

- Coordinate to ensure consistency with regional transportation plans
- Modify the GMA environment goal to require climate change impacts
- Encourage the use of financing tools as developer incentives
- Encourage the use of new funding and existing targeted to urban centers

Parking Incentives and Management

Parking in CTODs should be managed to support commercial needs while encouraging employees to use alternatives to driving alone. Different sizes and types of CTODs require different parking incentives and management. As CTODs evolve and become higher density live, work, shop, and play areas, the parking management will have to evolve. Parking incentives and management for VMT and GHG emission reductions would be designed to decrease trips within and to CTODs.

Transportation Concurrency

GMA defines a specific transportation concurrency requirement. First, local governments must set level of service standards, or minimum benchmarks of performance, for transportation facilities and services. Once the level of service standard is established, the local government must adopt an ordinance to deny proposed developments if they cause the level of service for a locally-owned transportation facility to decline below the adopted standard; unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with development.

The specific LUCC recommendations that align with the Transportation IWG concurrency recommendations are:

- Better enable GMA Transportation Concurrency provisions to address all modes of transportation
- Provide technical assistance and guidance on how multimodal improvements or strategies in their transportation concurrency regulations
- Require local government to consider multimodal improvements or strategies in their transportation concurrency regulations

Urban Brownfield Redevelopment

Currently, EPA provides assessment grants on a nationally competitive basis, and the state's Brownfield revolving loan program is \$5.9 million federally funded.²⁷ Urban Brownfield re-development is a key strategy in evolving communities to more CTOD.

Bicycle and Pedestrian Accessibility

Bicycling and walking are essential components of achieving reduced VMT and complete CTODs. Half of all trips in Washington are less than three miles: 80 percent of such trips are made by automobile.²⁸ Trips

²⁷ <http://cted.wa.gov/site/790/default.aspx>

of up to 3 miles are easily within the capability of any physically-able adult to bicycle or walk for trips up to 1 mile. Bicycling and walking modes can be used for a greater portion of trips up to three miles if conditions for making those trips are appealing. The Victoria Transport Policy Institute²⁹ estimates VMT savings of 5-15 percent as a result of bicycling and walking improvements. An inclusive approach to designing roads and streets increases the walking and bicycling share of short trips, thereby reducing overall VMT. The approach called Universal Access or *Complete Streets*³⁰ complements these goals of promoting compact and relatively dense urban development.

Recommendations to Promote Housing and Employment Density

Housing and Employment Density Recommendation 1

Legislatively expand use of the Multi-Family Tax Exemption in HB 1910³¹ to allow any city planning under GMA to leverage and maximize the use of this tool. The change would likely attract multi-family development and innovative types of housing strategies such as accessory dwelling units, lot size averaging, cottage and other types of infill developments to existing, emerging or planned CTOD areas. This tool should be made available for any city planning under GMA to encourage the emergence of at least one CTOD (city center or activity center).

Housing and Employment Density Recommendation 2

Adjust grant funding criteria to support applications and expenditures in CTODs, including, establishing new revenue sources (tax credits, loans, revolving funds) and identifying new finance mechanisms that support increased density in CTODs, including:

- A. Infrastructure
 - Transit grants that support facilities in CTOD district, corridors or nodes.
 - Federal and state transportation grants—with grant criteria that encourage applications that focus funding in CTOD (district, corridor, or node).
- B. Development Supportive Financing (including grants)
 - Federal and State Housing Grants and Tax Credits that add density to CTOD areas. This will include the Washington State Housing Finance Commission grant and loan programs (wherever possible, new housing units for lower income households should be built where car ownership is a choice- not a necessity).
 - Loans (low interest and revolving funds that help achieve density goals).
 - New financing mechanisms,³² i.e., fees for development outside of CTODs that support development inside CTODs—or that support the multimodal transportation improvements identified as part of the CTOD network.

²⁸ Washington State Bicycling and Walking Plan, 2008

²⁹ http://www.vtpi.org/leed_rec.pdf

³⁰ Complete Streets is a comprehensive approach to designing, building and maintaining roads and streets. The central tenet of Complete Streets is to routinely accommodate all potential users, be they transit rider, bicyclist, walker, wheelchair user, truck or automobile. Complete Streets takes context-sensitive design (a criteria for applying standards based on anticipated usage on a particular project) and applies it system-wide. Complete Streets has been endorsed by, among others, The American Public Transportation Association; American Planning Association and the Institute of Transportation Engineers. Four communities in Washington have enacted ordinances or directives on Complete Streets.

³¹ HB 1910 – *Modifying property tax exemption provisions relating to new and rehabilitated multiple-unit dwellings in urban centers to provide affordable housing requirements.* <http://apps.leg.wa.gov/documents/billdocs/2007-08/Pdf/Bills/Session%20Law%202007/1910-S2.SL.pdf>

³² Funds to create a CTOD support network are going to be needed and the subgroup has not identified any “new” funds – just prioritizing funds that are already stressed.

Housing and Employment Density Recommendation 3

Leverage Public/Private partnerships and relationships. Clarify and publicize possibilities for using public land in urbanized areas for private development that contribute density or necessary uses or facilities to the CTOD. Use private development projects for some public use (park and ride as part of a development).

- Community, Trade, and Economic Development (CTED) should work with the Association of Washington Cities (AWC) to publicize opportunities for using public land in urbanized areas for private development that contribute density, necessary uses, or facilities to the CTOD, including working with developers, elected officials, and government agencies.
- Local governments and the development community should draft model ordinances for housing choices that both address the demands of housing consumers and that meet density objectives in a variety of settings, and also develop education and technical assistance tools and models that show how to market developable properties.
- Explore opportunities, including possible state legislation, to ensure surplus state or local government properties are prioritized for housing, or joint, mixed purposes.
- Transit agencies should work with WSDOT and local governments to coordinate increased density around park and ride lots. This should include not only density around park and ride lots but included as part of the actual proposal with housing/commercial uses utilizing the air space over the park and ride lots.

Housing and Employment Density Recommendation 4

Perform education and outreach to decision makers to overcome barriers to CTOD development .

- CTED should take the lead on clarifying land aggregation tools and concurrency options for use in CTODs and offer resources that support community discussions about the role of CTODs in sustainable communities.
- AWC should publicize information and offer workshops to inform cities about the options and tools to increase successful CTODs.

Housing and Employment Density Recommendation 5

WSDOT should work with RTPOs and Metropolitan Planning Organizations to develop measures to reduce per capita VMT and assure involvement of the public in preparing and updating those measures for inclusion in the Regional Transportation Plan.

Recommendations for Parking Incentives and Management

Parking Incentives and Management Recommendation 1

Direction and education at the state level that recognizes the importance of parking management in CTODs. WSDOT should take the lead on parking management education programs and collaborate with CTED and AWC on educational programs and assistance:

- Illustrate successful implementations of 'climate friendly' parking management through case studies.

- Assist CTODs in forming Transportation Management Associations to work toward self sustaining parking management and Commute Trip Reduction organizations. WSDOT is the lead organization.
- Describe the role of car-sharing, e.g., zip car, for parking management in dense areas.
- Educate developers and publicize the cost of 'free parking' (i.e., ability to have better/more revenue generating units in the same building.).

Parking Incentives and Management Recommendation 2

To address minimum/maximum parking thresholds at the state/regional level, regional parking maximums should be made a requirement of Regional Transportation Plans to address minimum/maximum parking thresholds at the state/regional level.

This would raise public understanding about the importance of parking management and help eliminate jurisdictional fear of losing part of the tax base revenue by having more rigorous parking standards.

Parking Incentives and Management Recommendation 3

Explore revenue and funding options, i.e., parking tax for dense urban locations, with funds made available for projects and programs in the CTOD and tax credits for lower parking ratios.

Parking Incentives and Management Recommendation 4

Provide regional transportation funding for transit and multimodal infrastructure facilities (including transit, bicycle/pedestrian improvements, rideshare, etc.) in return for developer(s) maximizing development density and minimizing project parking. The purpose of this action is to link transportation improvements to land use decisions and projects that help maximize density, and to include strong parking management in CTODs.

Parking Incentives and Management Recommendation 5

Prohibit the construction of principal-use long term parking; and allow shared parking.

Parking Incentives and Management Recommendation 6

WSDOT, with support from CTED, should maintain state grant support for focused trip reduction programs in CTODs, modeled after the GTEC projects currently being implemented in seven urban centers throughout the state.

Parking Incentives and Management Recommendation 7

The Transportation IWG identified several other parking management strategies that merit further research. WSDOT and CTED should work together to research and identify the most promising of these strategies:³³

- Change state legislation authorizing a commercial parking tax to allow monthly reserved parking to be taxed, and require parking tax revenues to be spent on transportation alternatives to driving (2007 CAT Recommendation).

³³ Research should consider impact on businesses including tourism as well as housing projects and account for how implementation would impact the different sizes of CTOD that exist and/or planned for in the various counties throughout the state.

- Create the ability to charge a higher parking tax for monthly, long-term or commuter parking than for short-term parking (2007 CAT Recommendation).
- Develop and implement congestion pricing for special-events parking.
- Implement variable parking pricing for different areas and times of day, including local rates for parking.
- Consider charging at high use park and ride lots as a way to manage demand and raise revenue. Identify opportunities for funding incentives to developers who develop housing facilities that reduce or intercept traffic impacts on already overburdened major roadways.
- Increase density and reduce parking requirements for valet parking.
- Reduce parking rates or provide priority parking for ridesharing/HOVs.
- Provide incentives to employees and employers for parking management (e.g., employees cash out their free parking or employers provide mini fleet for employees).
- Restrict 'early bird specials' in congested downtown areas.
- Reconfigure street parking for bicycles/scooters and angled vs. parallel parking.

Recommendations to Encourage Bicycle and Pedestrian Accessibility

Bicycle and Pedestrian Accessibility Recommendation 1

The Washington State Legislature should affirm that walking and bicycling for transportation purposes offer many benefits to individuals, their communities, and the state, including improved health for individuals and no harmful pollution. As part of a balanced transportation system, walking and bicycling will reduce the amount of trips made by car, thereby reducing GHG emissions caused by motor vehicles.

The Washington State Legislature should adopt a policy based on the broad concepts identified by the Complete Streets³⁴ national movement. Exceptional conditions should be recognized and accommodated, such as:

- Excessive cost to include Complete Street elements (>20 percent of total).
- No identified need (quiet neighborhood streets with sidewalks and parking).
- Exempt projects as approved by the Secretary of Transportation.

To provide sufficient lead time for planning and budgeting in communities throughout Washington, improvements should be prioritized as follows:

By 2009: The Office of Superintendent of Public Instruction shall review its school-siting policies and practices, and report to the Washington Legislature on recommendations to reduce VMT to and from schools by Dec. 15, 2009.

By September 1, 2010, the Superintendent of Public Instruction and local communities should develop, in cooperation with local school districts, an investment strategy, that:

- Ensures all elementary and middle schools in urban areas are connected to pedestrian routes within a 1.5 mile circumference of the school entrance; and
- Ensures all high schools in urban areas are connected to pedestrian routes within a 2.0 mile circumference of the school entrance.

By 2009: The Legislature shall identify a funding strategy to fulfill all elements in the adopted Washington State Bicycle and Walking Plan,³⁵ published in 2008, including training, and facility funding.

By 2009: WSDOT, counties and cities in Washington shall have begun training all traffic engineers and planners on the design and engineering elements that promote walking and bicycling and ADA, through

³⁴ <http://www.completestreets.org/>

³⁵ <http://www.wsdot.wa.gov/BIKE/PDF/BikePedPlan.pdf> (7.67mb)

courses developed in conjunction with the WSDOT Bicycle and Pedestrian Program. By 2013, the Secretary of Transportation shall require that all planners and engineers working for WSDOT have completed an approved course on walking and bicycling.

By 2010: All state transportation funds and state public works transportation funding shall include Complete Streets criteria when completing state projects or awarding state funding for local projects.

By 2011: The Legislature shall identify funds to fulfill all elements in the adopted Washington State Bicycle and Walking Plan published in 2008.

By 2011: All cities shall adopt policies (through rule or by ordinance) modeled on the broad concepts identified in Complete Streets. Cities opting to not develop policies shall have to justify their decision in terms of alternative plans for reducing VMT when applying for state transportation grant and loan funding.

By 2012: The Legislature should implement the recommendations from WSDOT's Transportation Demand Strategies for Schools study. All school districts in the state shall develop transportation plans which identify strategies to encourage non-SOV driving to school.

By 2014: All urban areas designated under the GMA shall have produced a bicycle and walking master plan (or two separate plans) and identify funding strategies to complete the execution of the plan(s) in their six year "capital facilities" plans. By 2018, these urban areas shall have demonstrated progress toward completing projects identified in their plans.

Recommendations to Encourage Urban Brownfield Redevelopment

Urban Brownfield Redevelopment Recommendation 1

The Transportation IWG recommends including state funding for Urban Brownfield Redevelopment and adding a grants component that augments the state's Brownfield revolving loan. These actions will result in opportunities for land aggregation, promoting town centers, and promoting compact development.

Quantification of the GHG Emissions Impacts from the CTOD Strategy

Review of CTOD Impact Quantification during 2007 CAT

The CTOD strategy developed during the 2007 CAT process was estimated to reduce 2020 VMT by 7 percent and reduce annual GHG emissions by 1.6 MMtCO₂e by 2020. The 7 percent VMT reduction was based on the Puget Sound Regional Council's Vision 2040,³⁶ which modeled "Metropolitan Cities Alternative," as well as from land use scenario modeling in other metropolitan areas, and from the judgment of several travel modeling experts who have worked in the Pacific Northwest region.

Alternative Quantification Method

An alternative method for calculating CTOD GHG impacts is suggested in the *Growing Cooler* report released in September 2007 by the Urban Land Institute.³⁷ This method uses the following formula:

$$\begin{array}{c} \text{\% Market Share of Compact Development} \\ \times \\ \text{\% of Total Development Built between 2010 and 2020} \end{array}$$

³⁶ <http://www.psrc.org/projects/vision/index.htm>

³⁷ Reid Ewing et al, *Growing Cooler: The Evidence on Urban Development and Climate Change*. Urban Land Institute, 2007. <http://sgusa.convio.net/site/DocServer/GrowingCooler9-18-07small.pdf?docID=4061>

$$\begin{array}{r}
 \times \\
 \% \text{ VMT Reduction with Compact Development} \\
 \times \\
 \text{Ratio GHG/VMT Reduction with Compact Development} \\
 \times \\
 \text{Baseline Projection of Urban On-Road GHGs in 2020} \\
 = \\
 \text{GHG Reduction with Compact Development by 2020}
 \end{array}$$

Each of these factors is briefly described below.

% Market Share of Compact Development—The first factor represents the portion of development built between 2010 and 2020 that will be compact (or transit-oriented). *Growing Cooler* notes that this market share is currently small but growing rapidly. Market share is likely to increase dramatically during the forecast period for two reasons; the current undersupply of compact development relative to demand, and changing demographics. Based on analyses of recent construction data in California, the 2010-2020 proportion of GHG emission reductions from compact development in California is estimated to be between 50 percent and 70 percent.³⁸ In its Draft AB 32 Scoping Plan, which describes how California will achieve its GHG emission limits, the California Air Resources Board (CARB) assumed this proportion would be 30 percent.

% of Total Development Built between 2010 and 2020—The cumulative effect of compact development also depends on how much new development or redevelopment occurs relative to a region's existing development pattern. In the context of California, both CARB and Ewing estimate that one quarter (25 percent) of California's built environment in 2020 will be built between 2010 and 2020.

% VMT Reduction with Compact Development—There is extensive literature on the effects of compact and transit-oriented development on VMT. *Growing Cooler* suggests this fraction is 20 percent to 40 percent. CARB's AB 32 Scoping Plan assumes 30 percent.

Ratio GHG/VMT Reduction with Compact Development—Compact development may not reduce CO₂ emissions by exactly the same proportion as VMT because of CO₂ penalties associated with cold starts and reduced vehicle operating speeds. *Growing Cooler* estimates the ratio of CO₂ to VMT reduction to be around 0.93.

Baseline Projection of Urban On-Road GHGs in 2020—Total forecast Washington on-road GHG emissions in 2020 is 37.7 MMtCO₂e. CTOD would affect only urban VMT. Urban VMT currently accounts for 70.8 percent of total VMT in the state; therefore, 2020 urban on-road GHG emissions are estimated to be 70.8 percent of 37.7, or 26.7 MMtCO₂e. Since the state is urbanizing and the share of urban VMT will rise in the future, this is a conservatively low assumption.

Results

Total CTOD GHG reduction can be estimated by multiplying the factors described above. The table below shows these calculations using the high- and low-end estimates for each. The upper end of the range (1.7 MMtCO₂e) is very close to the CTOD estimate from the 2007 CAT (1.6 MMtCO₂e).

	Lower	Upper
% Market Share of Compact Development	30%	70%
x		
% of Total Development Built between 2010 and 2020	25%	25%
x		

³⁸ Ewing, Reid and Arthur C. Nelson, "CO₂ Reductions Attributable to Smart Growth in California," 2008.

% VMT Reduction with Compact Development	20%	40%
x		
Ratio GHG/VMT Reduction with Compact Development	90%	93%
x		
Baseline Forecast of Urban On-Road GHGs in 2020	26.7	26.7
=		
GHG Reduction with Compact Development by 2020 (MMtCO ₂ e)	0.4	1.7

III. Climate Change and Transportation Funding—Crisis and Opportunity

The climate change and transportation funding crisis requires urgent action. The challenge facing the state is implementing appropriate strategies to reach Washington's GHG emission and VMT reduction targets while addressing the impacts of the revenue shortage on state and local transportation infrastructure and operating expenses and on the ability of transit agencies to provide appropriate levels of service.

Existing Statewide Transportation Funding Sources Are Declining

Primary methods of funding transportation programs and projects in Washington include a portion of the sales tax on new and used vehicles, weight fees, and the gas tax. Seventy-nine percent of Washington's transportation funding is generated through Washington's 37.5 cent per gallon gas tax and the federal gas tax. County and city transportation funding also rely heavily on gas tax receipts and sales tax revenue.

The transportation sector's dependence on gas consumption for revenue creates a paradox: as citizens contribute to climate solutions by driving less and using more efficient vehicles, the revenue available for transportation projects, including those projects designed to reduce GHG emissions, declines. External factors, such as unstable fuel prices and improved fuel economy standards, can also result in less fuel usage and further reducing available revenue.

WSDOT estimates that it will receive \$252 million less funding over the next three years due to reduced revenue from the gas tax and other sources. Budget experts predict a continued softening of gas tax revenue in the 09-11 biennium. The Washington State Multimodal Transportation Fund, which relies on the sales tax on new and used cars, rental car tax, and motor vehicle license fees, is not expected to maintain existing levels of revenue.

Shortage of Revenues for Transit Service

Transit agencies across the state are experiencing a growing demand for service, however; operations and fuel costs are increasing, while most transit agencies are experiencing unprecedented declines in sales tax revenue. A new funding source is needed.

Reexamining Investments Strategically to Leverage What We Have

The Transportation IWG believes that state, regional, and local transportation investments and operations should be aligned with the achievement of the VMT and GHG reduction provisions of ESSHB2815. This will mean reexamining not just proposed new investments, but also existing investments to ensure that we can achieve GHG and VMT reductions through our transportation policies, as well as meeting traditional objectives of transportation spending.

New Revenue Sources

In addition to making systemic improvements in the allocation of available capital to meet all the existing objectives of Washington's transportation sector, Washington needs a funding approach to transportation that generates revenue sufficient to provide those options - including support for transit - that are essential to meeting Washington's GHG emission reductions and VMT benchmarks. The current local and state transportation sources are not adequate or stable. The gas tax cannot supply revenue to support increased local transit necessary to reduce GHG emissions and VMT. The Transportation IWG believes that structuring additional transportation funding options around user fees other than the gas tax

provides the most promising opportunity to generate future revenue for system improvement, operation, and maintenance; to influence travel behavior through reduced demand for SOV capability; and to support the creation of transportation options, i.e. transit and other forms of non-SOV travel. The 2007 CAT identified a series of revenue tools for the Legislature to consider. A specific recommendation around one (transportation pricing) is being forwarded in 2008 (see Transportation Recommendation 4, below); however, the original list remains relevant and contains revenue tools that warrant further consideration, including user fees, local option taxes, and statewide revenue sources.

Transportation Funding Recommendations

Transportation Funding Recommendation 1

The Transportation IWG believes that state, regional, and local transportation investments and operations should be aligned with the achievement of the VMT and GHG reduction provisions of ESSHB2815. This will mean reexamining not just proposed new investments, but also existing investments to ensure that we can achieve GHG and VMT reductions through our transportation policies, as well as meeting traditional objectives of transportation spending.

Transportation Funding Recommendation 2

Washington State should continue to pursue new revenue sources to support transportation choices, particularly transit operations.

Discussion Points

- One Transportation IWG member believes that Washington needs to step back and take some time to assess the impacts and possible unintended consequences of the benchmarks in ESSHB 2815 for reducing VMT per capita. This member expressed concern that the VMT benchmark numbers adopted in ESSHB 2815 were not fully vetted during the 2008 legislative session, and may not be realistic. The member noted the following statement from the September 2008 edition of the Puget Sound Regional Council's 'Regional View' newsletter: "While total VMT increased in 2007, VMT per capita decreased over 2006 levels from 23.1 to 22.9 vehicle miles per capita per day... VMT per capita generally leveled off or increased minimally during the 1990s and has been declining slightly since 1999 when it peaked at 24.2 VMT per capita."
- One Transportation IWG member expressed concern that all of the potential user fees identified by the 2007 CAT are motor vehicle user fees, and stated that the approach to user fees needs to be balanced. Since the general population benefits from transportation investments, everyone—not just those who drive motor vehicles -- needs to help fund the system.

IV. Transportation Pricing

The Transportation IWG explored how transportation pricing can help meet the state's targets to reduce GHG emissions and VMT. Transportation pricing strategies are recommended to reduce per capita VMT and GHG emissions, raise needed revenue and manage the system for better efficiency and reliability. Usage-based pricing strategies such as tolls, parking charges, and per capita VMT or gasoline taxes, are all examples of strategies that cause travelers to adjust their travel habits and reduce per capita VMT and GHG emissions accordingly. Pricing strategies can contribute to further per capita VMT and GHG emission reductions when used to fund alternatives such as transit, ridesharing, bicycling, and walking, or provide an incentive to invest in a more efficient vehicle.

The 2007 CAT identified a series of revenue tools for the legislature to consider, of which the Transportation IWG is providing specific recommendations for only one: transportation pricing. Washington began using highway pricing with the introduction of tolls on the Tacoma Narrows Bridge to finance its expansion. Since then, the state has embarked on a pilot project to convert HOV lanes on State Route 167 into High Occupancy Toll (HOT) lanes, and tolling is anticipated as part of the financing plan for the SR 520 bridge replacement, the Columbia River Bridge crossing, and the I-405 express lanes, among other potential applications.

Pricing and Funding Policies

A legislative policy framework for tolling was established by ESSHB 1773.³⁹ This framework provides the legislature with authority to impose tolls and maintains the Washington Transportation Commission's role to set toll rates for tolled facilities. By law, Washington's objectives for tolling include both generation of revenues for transportation, as well as a mechanism to help manage traffic volumes and congestion.

The Transportation IWG recognizes that there are funding policy issues that need to be addressed by the Washington State Legislature, Washington Transportation Commission and WSDOT. Funding from all sources (federal, state, regional and local levels) will be required to implement the strategies to achieve the per capita VMT and GHG emission reductions. There needs to be clarity regarding the state's role in addressing the transportation funding shortfall facing the federal, state, regional and local levels, the use of tolling revenues to fund regional and local investments, and whether the state should help fund transit.

Effect of Pricing on VMT

The Transportation IWG believes it will be difficult for Washington to meet its GHG and per capita VMT reductions without usage-based transportation pricing. Tolls, parking charges, and VMT or gasoline taxes are all examples of usage-based pricing. From the traveler's point of view, each of these methods causes the driver to consider whether the trip they are making is worth the cost and to adjust their driving habits accordingly—some will choose to use transit, vanpools, or carpools, others will shift their trip to another time of day. Some will determine that the trip was not needed or a shorter trip will suffice. Road pricing can be structured to lower per capita VMT while managing traffic flows more efficiently and providing more trip time reliability.

Road pricing could further reduce VMT by funding alternatives such as transit, ridesharing, bicycling, and walking or providing an incentive to invest in a more efficient vehicle.

³⁹ A legislative policy framework for tolling was established by ESSHB 1773. This framework provides the legislature with authority to impose tolls and maintains the Transportation Commission's role to set toll rates for tolled facilities. By law, Washington State's objectives for tolling include both generation of revenues for transportation, as well as a mechanism to help manage traffic volumes and congestion.

Puget Sound Regional Council has estimated that full system road pricing (including arterial streets) could reduce per capita VMT by approximately 10 percent by 2020, and full freeway tolling could reduce GHG emissions by 6 percent compared to a no action option. The per capita VMT reduction could be greater (or less) with different toll rate assumptions and with additional investments in the transportation system.

Many factors influence the contribution of pricing to per capita VMT and GHG emissions reduction:

- **How toll rates are set:** Higher tolls provide a greater incentive to conserve travel. Toll charges that vary based on distance, congestion levels, or auto-occupancy, for example, could provide incentives to make shorter trips, to avoid congested periods, or to rideshare.
- **How revenues are spent:** Toll revenues that fund transit operations or other alternative modes will likely have a greater impact on GHG emissions reduction than if they are used for new freeway capacity expansion. In addition, revenues should be used to fund increased mobility for freight throughout the state, as more efficient cargo movement leads to reduced GHG emissions. Pricing and how revenues are spent should be considered together to determine the GHG emissions reduction potential of pricing.
- **How comprehensively tolling is implemented:** If tolls are applied on a corridor basis they are more likely to be tied to road expansion projects and will have a more constrained effect on demand management. A more comprehensive approach may cause drivers to make a more substantial change in travel decisions.
- **Effect on transportation performance:** Paradoxically, reducing demand typically results in improved speeds and increased throughput per lane per hour on congested roadways. Improved freeway performance may incent some people to make trips they would have avoided under more congested conditions.

Transportation Pricing Recommendations

The Transportation IWG recommends using transportation pricing as a strategy for raising needed revenue as well as a method to manage the system for better efficiency and reliability. Tolls would provide new revenues to supplement gas tax revenue.

The following recommended actions could increase the effect of pricing to achieve the per capita VMT and GHG emission reductions:

Transportation Pricing Recommendation 1

Per capita VMT and GHG emissions reduction should be considered as a third objective to WSDOT's existing tolling objectives of revenue generation and efficient traffic management⁴⁰ in project design, development of pricing strategies and actions, and in the regulation of toll rates.

Transportation Pricing Recommendation 2

Toll revenues should be used to fund more sustainable travel options (e.g. transit, ridesharing). The State Legislature should provide direction to include transit operations and other sustainable transportation investments, such as increased freight mobility throughout urban corridors, as part of individual tolling authorizations.⁴¹

⁴⁰ A legislative policy framework for tolling was established by ESSHB 1773. This framework provides the legislature with authority to impose tolls and maintains the Transportation Commission's role to set toll rates for tolled facilities. By law, Washington State's objectives for tolling include both generation of revenues for transportation, as well as a mechanism to help manage traffic volumes and congestion.

⁴¹ Discussion point: Although most Transportation IWG members supported this recommendation, some members expressed concern about taking funding away from maintaining, repairing, and upgrading Washington's roads, highways, and bridges. Their preference is to have the legislature identify a dedicated funding source for transit, as they also believe that transit is a very important component in helping to solve the transportation congestion problem.

Transportation Pricing Recommendation 3

Toll strategies should be designed to incorporate incentives to individual actions that reduce per capita VMT and GHG emissions. The Washington Transportation Commission should establish toll rate policies that encourage drivers to make fewer and shorter trips, use less polluting vehicles, and consider alternative modes other than SOV driving (e.g. subsidize or exclude transit and carpools, provide incentives for new or retrofitted trucks with reduced emissions, and/or charge higher prices for more polluting vehicles).

Transportation Pricing Recommendations 4 and 5

Tolling should be applied more broadly to promote greater achievement of revenue, efficiency, and GHG emission reductions (in addition, broad application also helps avoid geographic inequity due to tolling some roads and not others, and could set a context allowing more flexible use of revenues and greater consistency in the application of tolls from the customer's point of view). Two specific opportunities include:

- In 2009, the State Legislature should grant authority for tolling of the Cross-Lake corridor including SR 520 and I-90.
- In 2010, the State Legislature should establish a legislative task force to review tolling authority, and explore how to move towards a system-wide application of tolling, rather than on a project-by-project approach.

Transportation Pricing Recommendation 6

- The State Legislature should establish a task force on state and local transportation funding to propose tolls and other pricing mechanisms that could fund transportation and transit needs and create price incentives to reduce per capita VMT and GHG emissions, with a goal of passing expanded transportation pricing and funding legislation. Tolls are not the only form of pricing that could address GHG and VMT reduction benchmarks. A low VMT future would encourage local travel, requiring greater investment in local infrastructure. Other pricing mechanisms should also be considered that may be more directly linked to GHG or VMT reduction and that could be applied at both the local and regional scale. The pricing mechanism should:
 - **Give priority to transit and freight operations.** Design of tolled facilities should incorporate priority measures where appropriate to facilitate fast and reliable transit and freight operations. Tolling policies should recognize that international trade depends on freight mobility to move goods to and from the state's ports. The states' competitiveness in the international marketplace is linked to speed and efficiency in moving cargo. Actions should be considered that increase movement of people and goods.
 - **Be fair, consistent and transparent.** Tolls should be managed fairly, consistently, and transparently so that users can see the value of the pricing mechanism. Pricing mechanisms should provide users with reasonable alternatives (e.g. improved transit service and reliability) and specific identifiable stakeholders (e.g. freight interests) should receive direct benefits from their user fees.

Discussion Points

- Although most members supported recommendation #2, some Transportation IWG members expressed concern about taking funding away from maintaining, repairing, and upgrading Washington's roads, highways, and bridges. Their preference is for the Legislature to identify a

dedicated funding source for transit, as they also believe that transit is a very important component in helping to solve the transportation congestion problem.

- One Transportation IWG member does not support implementation of a broad-based set of pricing strategies to reduce VMT until policymakers have established a quantifiable service level threshold for acceptable transportation options.
- One member expressed concern that while tolling can certainly play a role in future transportation funding in Washington, it would be inappropriate to look to tolling to address all of the transportation funding challenges. This member felt that the greatest consistency in the application of tolls from the customer's point of view is to toll new facilities, use the revenues to pay for the construction, improvement and maintenance of the new facility from which the tolls are collected, and ensure that the tolls have a sound economic basis (i.e., reflect the actual costs of the facility).
- One member expressed concern that there is not enough validated cost effectiveness information to support the use of system-wide tolling as a traffic management strategy for reducing VMT and GHG emissions.
- One member indicated that using toll revenue to support highway expansion would set back ESSHB 2815 goal attainment. This member believed that at a minimum, new transportation investments that add capacity to the road system must be evaluated rigorously with respect to their human and environmental health costs and benefits that result from both construction and use. This member also felt that the Tolling Commission's research and analysis from the SR520 Tolling Outreach process clearly indicates that tolling policy aligned with the ESSHB 2815 targets will create sufficient revenue to fund operations and maintenance as well as transit enhancement and expansion.
- One member felt that the priority or parity of tolling policy drivers is much less important than whether or not pricing/tolling outcomes support the ESSHB 2815 emission limits. The Transportation IWG member emphasized that VMT and GHG emission impacts of all tolling projects should be assessed and reported to the public during design.
- One member felt that the discussion sidestepped the reality that the current transportation system is underfunded and that tolling is expected to provide the primary revenue source for building (and rebuilding) significant new infrastructure, such as the replacement bridges for SR 520 and the Columbia River Crossing in Vancouver, and the needed \$2 billion repaving of I-5 through Seattle. This member felt that price elasticity limits how much can be charged before people find alternatives.

V. Non-VMT Recommendations to Contribute to Reducing GHG Emissions

Given the need for a scalable multi-pronged approach to address the climate impacts of the transportation sector, five specific non-VMT transportation strategies are described and recommended that build on the work of the 2007 CAT:

- Improvements to Freight Railroads and Intercity Passenger Railroads
- Diesel Engine Emission Reductions and Fuel Efficiency Improvements
- Transportation Systems Management
- Low Carbon Fuel Standard
- Vehicle Electrification

In addition, the Transportation IWG was unable arrive at a recommendation on Zero-Emission Vehicles, but has documented its deliberations to assist decision makers.

A) Improvements to Freight Railroads and Intercity Passenger Railroads

Rail transport is one of the most energy efficient⁴² ways to move people and goods along major corridors—in general, rail emissions are 2 to 4 times less than for the same trip or service by car or truck. The following provides a general overview of GHG emission reductions that can be achieved by moving freight from truck to rail and passengers from car or airplane to rail.

Background

Figure 1 estimates the energy efficiency of different freight transportation modes for a typical load factor. According to a 2006 Hydro-Quebec⁴³ report, the average truck trip generates between 42-111 grams of CO₂ per kilometer of metric ton of freight moved, a cargo plane between 476-1,020 grams, whereas the same ton moved by train releases 20-28 grams of CO₂.

⁴² Efficiency is due to rail's ability to haul more cargo or people at a very low incremental energy requirement. For example, a commuter train with 1000 passengers and 8 cars takes a very small increase in fuel consumption over the same train with 25 passengers. Energy efficiency is not simply a mode question; load factor is as important if not more so.

⁴³ Luc Gagnon, Greenhouse Gas Emissions from Transportation Options, Hydro-Quebec, Direction-Environment, September 2006.

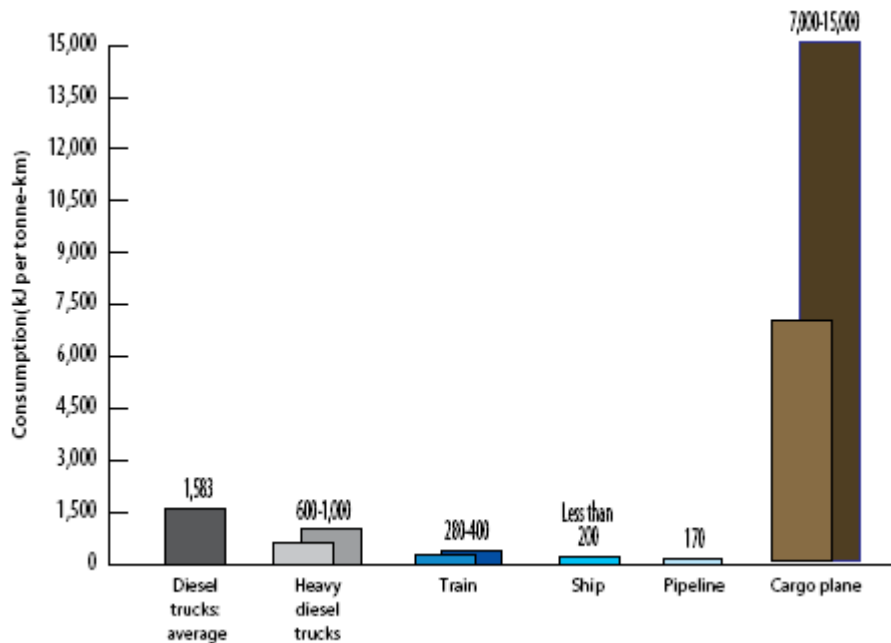


Figure 1: Efficiency of freight transportation modes for a typical load factor

Source: Luc Gagnon, Greenhouse Gas Emissions from Transportation Options, Hydro-Quebec, Direction-Environnement, September 2006.

Passenger rail also has GHG advantages over other modes of transportation that are equal to that of well-used bus. Figure 2 illustrates the different CO₂ emission levels generated by various modes of transportation:

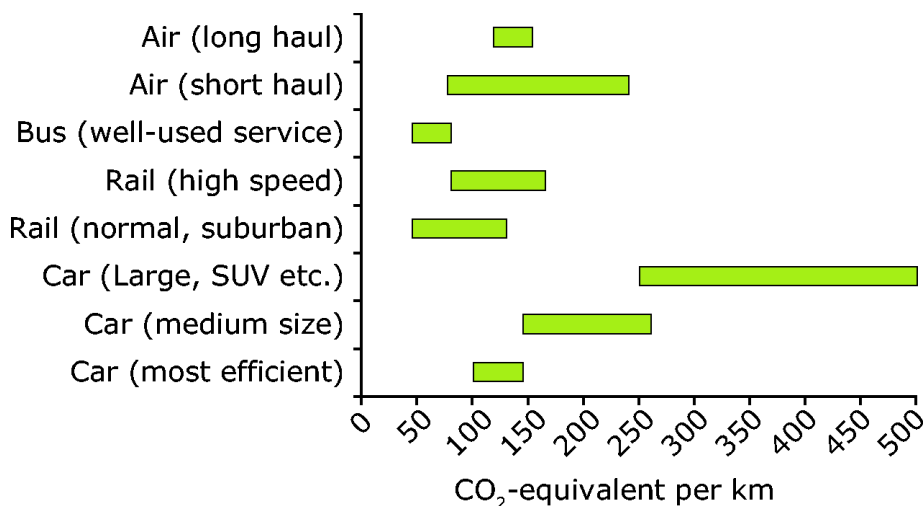


Figure 2: Range of emissions per passenger kilometer for different mode choices⁴⁴

Source: EEA Report No1/2008: Climate for a transport change.

Increasing the use of rail for both the movement of passengers and freight can help Washington make progress towards its GHG emissions reductions. On a national level, freight demand is projected to almost double in the next 35 years. Without improvements in freight rail capacity, this increase in demand

⁴⁴ EEA Report No1/2008: Climate for a transport change. Assumes one person per car, realistic load factors for air, bus, and rail based on European data.

would need to be accommodated by trucks using the freeway system. Increasing the capacity of the freight rail system—which could include maintaining and improving the physical condition of certain short-line⁴⁵ railroads—so that it can absorb at least part of the projected increase in freight will help reduce air emissions from movement of freight and goods. In the case of moving freight from trucks to trains, a net decrease in GHG emissions is tied to a permanent change in mode split: Freight volumes are forecast to grow, and if trucks shift one commodity to rail simply to haul another commodity on the road, there will not be a net decrease in GHG emissions.

As demand for passenger rail travel increases, reliable, fast service can be developed to meet demand and be competitive, competitive with the car or airplane. Washington is served by both intermediate and long-distance AMTRAK (Cascades, Coast Starlight and the Empire Builder) and Sounder commuter trains. With recent increases in gas prices, both systems have seen dramatic increases in ridership, and both systems are planning service expansions. Increasing commuter rail service can reduce shorter range drive-alone trips, while improving AMTRAK service can reduce reliance on air travel for intermediate length trips in the I-5 corridor between Eugene, Oregon and Vancouver, British Columbia.

However, developing the rail system of the future provides a number of challenges that must be addressed:

- **GHG reduction criteria:** Currently, Washington does not have the tools to consider GHG emissions when prioritizing transportation infrastructure investments at the state level. WSDOT is working on an approach to prioritize freight projects that includes mobility, environmental, economic, and other considerations. Some of the state's RTPOs, especially the Puget Sound Regional Council, have developed models that provide cost-benefit and environmental impact information on proposed projects and system adjustments. WSDOT will need to continue to work with Puget Sound Regional Council and other RTPOs to improve existing modeling tools and their application to consider a project's impact on GHG emissions appropriately in prioritizing investments.
- **Freight rail capacity assurances:** Almost all of the rail system infrastructure today is owned and operated by the private sector to serve the private sector's customer needs. Washington will need to continue working with the railroads to ensure reliable, competitive freight service while investing public resources to increase the capacity of the system for passenger rail.
- **Proprietary information:** Private ownership of rail infrastructure makes it more difficult to determine and establish a clear and effective role for the public sector when funding, operations, or related decisions about that infrastructure are made. Much of the information related to both is considered proprietary, so even determining project costs can be a difficult undertaking.
- **Revenue sources:** Rail is a capital-intensive mode of transportation. Developing reliable public sector funding sources that can provide the level of revenue required to implement the system improvements which provide a GHG emissions reduction benefits for both passenger and freight traffic is challenging. A long-term, consistent, public funding commitment is needed to make the necessary improvements and facilitate the potential GHG emissions reduction and economic competitiveness advantages of expanded rail use.

Rail Recommendations

Rail Recommendation 1

Eliminate existing bottlenecks and increase rail system capacity to accommodate growth in both freight and passenger movement.

⁴⁵ A short-line railroad is a railroad with an annual operating revenue of \$28 M or less, providing service for a relatively short distance, or operating in a rail yard switching rail cars.

On a national level, freight demand is projected to almost double in the next 35 years. Without improvements in freight rail capacity, this increase in demand would need to be accommodated by trucks using the freeway system. Increasing the capacity of the freight rail system—which could include maintaining and improving the physical condition of certain shortline⁴⁶ railroads—so that it can absorb at least part of the projected increase in freight will help reduce air emissions from movement of freight and goods.

There are two ways to improve the capacity of the freight rail system: by making operational changes, and by increasing the physical capacity of the system. Sometimes physical improvements are needed to maximize the benefits of operational changes and vice versa. (For example, increasing train lengths can provide benefits only if sidings along the mainline can accommodate the longer trains. On the other hand, increasing the length and number of sidings, for example along the Columbia River, allows for using the tracks along both sides of the river as a one-way couplet, increasing the operational capacity of the system even further). While both types of change are entirely in the purview of the commercial railroads, Washington State can help facilitate their implementation. Since freight railroads move freight with significantly less air emissions than trucks, it is important to ensure that they have the ability to increase service as freight volumes grow.

Passenger rail requires a capital investment in more train sets as well as right of way improvements. Increasing the capacity of the passenger rail system in such a way that it does not have a negative impact on freight rail can help reduce emissions by removing car and aircraft trips. Having completed the corridor improvements called for in the original Sound Move package⁴⁷ (1996), Sound Transit is currently negotiating a new agreement with Burlington Northern Santa Fe (BNSF) Railway for additional Sounder service between Seattle and Tacoma. The new agreement should commit to implementing projects that ensure mainline freight capacity in a timely fashion before additional Sounder trains are running.

In certain locations, separating the movement of passenger and freight trains maximizes the efficiency of both types of rail service. An example of such a project is the Point Defiance Bypass. Washington should begin to identify other locations where this separation might become necessary in the future.

Potential Projects

WSDOT is currently engaged in a process to develop a comprehensive approach to prioritizing and determining potential state action to implement freight and passenger rail projects. With the Washington State Long-Range Plan for AMTRAK Cascades, WSDOT has outlined long-term improvements needed to serve passenger rail demand in the long run. WSDOT's management of the AMTRAK Cascades service is currently identifying passenger rail service improvements and capacity with the Cascades Mid-Range Plan, which is due to the Legislature on Dec. 1st, 2008. The proposed approach includes an evaluation of the environmental, cost-benefit, safety, and other impacts on both rail users and the community at large. In coordination with the Cascades Mid-Range Plan, that process could be used to begin a dialogue with the railroads to implement the projects and operational changes that would increase the capacity of Washington's freight and passenger rail systems for east/west and north/south service in the short-, intermediate-, and long-term. For both freight rail using the Columbia River Gorge, and AMTRAK service, continued coordination with Oregon and British Columbia will be important in eliminating existing bottlenecks and increasing capacity.

The following list provides an overview of some of the projects and actions eliminating existing bottlenecks and increasing the capacity of the freight and passenger rail network in Washington State identified by previous planning and analytical efforts:

⁴⁶ A shortline railroad is a railroad with an annual operating revenue of \$28 M or less, providing service for a relatively short distance, or operating in a railyard switching rail cars

⁴⁷ <http://www.soundtransit.org/x2203.xml>

- Make improvements that support freight rail, AMTRAK, and Sounder service, including, but not limited to:
 - Triple-track the mainline between Seattle and Tacoma (This may be achieved with a new agreement between BNSF and Sound Transit as part of future Sounder service expansion.)
 - West Vancouver Freight Access and other improvements in the Portland area, including a new bridge across the Columbia River
 - Point Defiance Bypass
 - Blakeslee Junction
 - Martin's Bluff Third Mainline
 - Green River Industrial Leads
 - Port of Seattle access and ARGO Yard operations—Duwamish Corridor and second lead improvements
 - Mainline access to the Port of Tacoma—North Wye Junction and Puyallup River Crossing
 - Improved east/west service.
- Support the creation of joint operating and trackage agreements between the BNSF Railway and the Union Pacific (UP) Railroad to allow equal access to mainline infrastructure, such as the current and future Stampede Pass tunnel, and the Columbia River Gorge mainlines. Joint and directional operation on the Stevens Pass and Stampede Pass lines, and on the Columbia River Gorge lines, would facilitate an increase in the operational capacity of the state's freight rail system.

The costs of implementing this recommendation are currently unknown.

- Improve the Stampede Pass line to allow for double-stack service:
 - Crown the existing tunnels or build a new tunnel.
 - Provide complementary track upgrades.
 - Mitigate the impacts on local communities (e.g. M Street in Auburn).
 - Re-establish service on the Ellensburg to Lind line.
 - Operate Stampede and Stevens Pass as directional running corridors (i.e. as a one-way couplet).

The overall cost of making these improvements is unknown.
- Work with the Class 1 railroads to make the improvements needed to operate the BNSF and UP lines along the Columbia River as directional running corridors.
- Maintain a substantive program for improving and maintaining short line railroads that have sufficient projected freight to make a difference in air quality.
- Work to facilitate links to other rail forms of non-SOV travel.

Rail Recommendation 2

Preserve the potential for future east-west freight rail capacity improvements by extending the sunset date for the Ellensburg-Lind section of the old Milwaukee Road

In Washington, east-west rail capacity is limited by the Cascades. One of the three options to cross the mountains, Stampede Pass, currently carries only limited amounts of freight. Washington should retain the ability to convert this route to higher density use in the future, while avoiding negative air quality and community impacts from at-grade crossings along the route.

Farther east in this corridor, reactivating the Old Milwaukee Road line between Ellensburg and Lind can eliminate the need for grade crossings in the Yakima Valley. However, that opportunity will be lost unless the sunset date is extended during the 2009 Legislative Session. While reactivating that line is currently not financially viable, it is essential—coordinated with capacity increases at Stampede Pass—to increase competitive east-west freight rail service in the future. Preserving the Old Milwaukee Road line between

Ellensburg and Lind is dependent on legislative action and does not have a capital cost. Ultimately, Stevens and Stampede Passes could be operated as a one-way couplet, further increasing the capacity of the system.

Rail Recommendation 3

Complete the Freight Action Strategy (FAST) Corridor and other grade separation projects that significantly reduce idling of cars and trucks

At-grade rail crossings can slow trains and also cause cars and trucks to idle as they wait for trains to clear the crossing. The FAST Corridor program was established with the express purpose of eliminating such at-grade crossings between Tacoma, Seattle and Everett, to both reduce the impact of rail freight on local communities and to speed the movement of freight rail. The Freight Mobility Strategic Investment Board's project list contains a number of other rail crossings in other parts of the state. Eliminating at grade crossings, particularly in densely populated areas where trains cause significant back-ups on the roads they cross, has the potential to significantly reduce emissions from idling cars and trucks. The current cost estimate to complete the remaining FAST Corridor projects is \$890 million, of which \$631 million is currently unfunded.⁴⁸

Rail Recommendation 4

Further improve the fuel efficiency and reduce the air emissions of the equipment used by freight railroads

Due to both environmental considerations and high fuel prices, the Class 1 railroads operating in Washington have already begun to invest heavily in technologies to reduce their fuel consumption and related air emissions. Class 1 railroads generally have access to the capital needed to make these types of investments, which pay off in relatively short periods of time. Working with the railroads, clean air agencies, and the federal government to provide funding for pilot projects to test new and emerging technologies might be the best way to help facilitate the efforts of Class 1 railroads. Smaller short-haul and switching locomotive operators may find it difficult to access the necessary funds to improve the efficiency of their older locomotives and/or install anti-idling and other fuel saving equipment. A state grant or loan program targeted toward these smaller operators could be useful. The costs of making these efficiency improvements vary depending on the engine and other factors.

Following are examples of new and emerging technologies that are already being implemented. Such clean rail technology should continue to be pursued and implemented:

Clean, efficient locomotive power

BNSF has already installed anti-idling equipment on about 4,200 of its 6,500 locomotives. The installations have occurred on additional locomotives in BNSF's existing fleet and on all new locomotives. Approximately 40 percent (more than 3,500) of UP's locomotive fleet is now equipped with anti-idling technology. Tacoma Rail, a switching and short-haul operator, installed anti-idling devices on six of its 18 locomotive fleet. In addition, the use of Green Goats and Multiple Gen Set locomotives for switching operations by BNSF and UP can reduce emissions by 80-90 percent compared to conventional train engines.

Friction reduction

The railroads are also using emerging technologies such as lubricating the wheel flange of locomotives (1-5 percent decrease in fuel use), lubricating the top of the rail on the track itself, as well as installing low torque bearings in rail car wheels (up to 8 percent reduction in fuel use per train set) to reduce friction. Expanding use of these and similar technologies can further increase fuel efficiency.

⁴⁸ A recent analysis of the benefits from completing FAST Corridor projects indicated a slightly negative environmental impact. However, that analysis did not include any benefits due to rail.

Use of electric equipment

Another option for reducing emissions and increasing the capacity of the freight rail system is to use electric powered equipment where possible. Again, Class 1 railroads already implement these improvements where they are economically viable. In Spring of 2008, the BNSF reopened its North Seattle International Gateway intermodal yard after installing four electric powered, rail-mounted gantry cranes. The cranes move containers between trucks and rail cars, producing zero emissions, and reducing the need for diesel-powered trucks to move containers within the facility. There may be additional opportunities for use of electric equipment rather than diesel powered equipment at intermodal yards.

Rail Recommendation 5

Develop a methodology for determining when rail electrification might become viable in Washington, including how to leverage future federal grants and investments of rail electrification.

Electric trains do not produce local emissions, and in areas where a significant portion of electricity comes from non-fossil sources, such as Washington, electric trains may produce fewer GHG emissions than diesel trains and are therefore an attractive option from a GHG emissions point of view.

However, a significant disadvantage for electric rail is the high cost of providing the necessary infrastructure. In North America, the flexibility of diesel-electric locomotives, and the relative low infrastructure cost led to their dominance over pure electric engines due to relatively low traffic densities (except for commuter service in dense urban corridors in the Northeast).

It is unlikely that the economics driving the use of diesel-electric engines today will change in the foreseeable future, especially for freight rail. However, Washington may reach passenger rail traffic densities that warrant a separation of passenger and freight rail service in the I-5 corridor. At that point, electric trains may be a viable alternative for providing passenger service.

B) Diesel Engine Emission Reductions and Fuel Efficiency Improvements

Impacts on Goals

In addition to the stated benefits in the 2007 CAT *Diesel Engine Emission Reductions and Fuel Efficiency Improvements* strategy, diesel engine emission reductions may have additional climate protection benefits from the reduction in diesel soot. The Transportation IWG reviewed recent research and found the following:

- National experts identified black carbon emissions second only to carbon dioxide (CO₂) in causing global warming, and may have as much as 60 percent of the global warming effect of CO₂.⁴⁹ Black carbon adds 2-3 orders of magnitude more energy to the climate system than an equivalent mass of CO₂.^{50,51}

⁴⁹ Ramanathan V. Scripps Institution of Oceanography University of California at San Diego. *Role of Black Carbon on Global and Regional Climate Change*. Testimony to the House Committee on Oversight and Government Reform. October 18, 2007.

⁵⁰ Jacobson, MZ. *Testimony for the Hearing on Black Carbon and Arctic*, House Committee on Oversight and Government Reform. United States House of Representatives. October 18, 2007.

⁵¹ Bond TC. *Testimony for the Hearing on Black Carbon and Climate Change*. House Committee on Oversight and Government Reform. US House of Representatives, October 18, 2007.

- New research also suggests that black carbon emissions may explain a significant fraction of the observed arctic warming, which is approximately twice as rapid as the rest of the Earth.⁵² Similarly, a recent analysis by the U.S. Climate Change Science Program finds that “by the year 2100, short-lived gases (e.g. soot) and particles may account for as much as 40 percent of the warming over the summertime continental US.”⁵³
- Unlike carbon dioxide, which remains in the atmosphere for several decades, black carbon remains in the atmosphere for ten days to two weeks. As a result, decreasing emissions of black soot by implementing programs such as those identified in the CAT 2007 Diesel Engine Emissions Reduction strategy may have immediate climate protection benefits. Installing diesel particulate filters and other soot reducing after-treatment devices on diesel engines, retrofitting diesel engines in the marine industry, and transitioning to alternative fuels are a few examples of existing technologies that could be employed to reduce diesel particulate and black carbon.

Additional Benefits

In addition to the climate protection benefits associated with reducing black carbon, diesel particulate is associated with increased cancer risks and a variety of non-cancer health effects including respiratory diseases and increased mortality rates.^{54,55} As a result, enhancing and strengthening the existing diesel emission reduction efforts throughout the state will have additional public health benefits. EPA analysis of new engine standards for on-road, off-road, inland marine and locomotive engines have shown a benefit to cost ratio as high as 60 to 1 for cleaner diesel engines. Diesel retrofit programs provide a lesser benefit to cost ratio, but EPA has estimated that retrofit programs should provide a 10 to 1 benefit to cost ratio (that is, that \$10 in public health benefits should be realized for every \$1 invested in diesel retrofit cost). The specific benefits will vary for each engine type and project, but these are the best estimates that US EPA has put forward.⁵⁶

Costs

Because exact estimates were not readily available, the following are general estimates of the costs of these strategies for the Puget Sound region from the Puget Sound Clean Air Agency (PSCAA). The PSCAA estimates there are approximately 22,500 on-road vehicles that are suitable for retrofit or replacement.⁵⁷ Similarly, the PSCAA estimates that there are approximately 7,200 non-road vehicles eligible for retrofit or replacement.^{58,59} The PSCAA estimates that diesel retrofits cost anywhere between \$1,000 to \$15,000 to purchase and install. The PSCAA also believes that a focus on grants and incentives for vehicle replacement with new, lower emission and higher fuel economy vehicles will be a key strategy and that incentives similar to those already established for light duty vehicles have merit.

Grant funds available through the EPA, the West Coast Collaborative and the Washington State Legislature have allowed regional and state agencies to begin diesel reduction programs. However,

⁵² Zender CS. *Arctic Climate Effects of Black Carbon*. Written Testimony to the Oversight and Government Reform Committee. United States House of Representatives. October 18, 2007.

⁵³ Climate Change Science Program, 2008: *Climate Projections Based on Emissions Scenarios for Long-Lived and Short-Lived Radiatively Active Gases and Aerosols*, Executive Summary. H. Levy II, D.T. Shindell, A. Gilliland, M.D. Schwarzkopf, L.W. Horowitz, (eds.). Department of Commerce, NOAA's National Climatic Data Center, Washington, D.C., USA

⁵⁴ Keill L and N Maykut. *Puget Sound Air Toxics Evaluation*. Puget Sound Clean Air Agency. October 2003.

⁵⁵ U.S. EPA. *Air Quality Criteria for Particulate Matter (October 2004)*. U.S. Environmental Protection Agency, Washington, DC, EPA 600/P-99/002aF-bF, 2004.

⁵⁶ Extensive information on the public health benefits versus costs of EPA diesel engine programs can be found at: www.epa.gov/otaq.

⁵⁷ The Puget Sound Clean Air Agency considers vehicles built prior to 1994 to be eligible for replacement, while vehicles manufactured between 1994 and 2006 may benefit from diesel emission retrofit technologies.

⁵⁸ Since non-road emission standards were implemented in 1996, the Agency recommends that diesel engines from model year 1996 and newer are considered suitable for retrofits, while those that are older than 1996 are better suited for replacement.

⁵⁹ Personal communication, L Stanton, Puget Sound Clean Air Agency, October 17, 2008.

additional funds would leverage reduction efforts that would not normally have occurred with the current levels of incentives. These estimates are examples of the Puget Sound region. State agencies should develop comprehensive cost analyses for state-wide programs.

Relationship to Other Efforts

The Transportation IWG fully recognized that a number of diesel retrofit programs are currently underway among local and state jurisdictions across Washington. These programs would provide additional climate protection benefits, based on emerging information around the climate impacts of black carbon. The Transportation IWG fully supports these existing programs and, as shown below, include additional recommendations that strengthen and enhance these initiatives.

Diesel Engine Emission Reductions and Fuel Efficiency Improvements Recommendations

Diesel Engine Emission Reductions and Fuel Efficiency Improvements Recommendation 1

Recommendation: Implement the original 2007 CAT *Diesel Engine Emission Reductions and Fuel Efficiency Improvements* strategy, with the following additions:

- 1) Support and promote a wide range of diesel emission reduction programs, including diesel retrofits. These programs have the potential to provide climate benefits, especially if they are extended to private fleets, as most public fleets have now been retrofitted. These benefits are in addition to the public health benefits afforded by significant reductions in highly toxic diesel particulate.
- 2) Reduce engine-idling through regulatory and voluntary/education programs. A number of states have implemented anti-idling requirements and programs, including increased awareness through education and recognition programs. Fleets using telematics, driver education, or auxiliary power units have reported considerable success in reducing idling. Anti-idling programs also provide direct fuel savings and air quality benefits.
- 3) Accelerate fleet turnover. Washington should develop regulatory, incentive-based and voluntary approaches to speed introduction of new, cleaner engines, recognizing that this may be highly cost-effective with the unstable price of fuel. The Transportation IWG also recognizes that incentive-based programs may be needed to help small fleets and independent operators achieve regulatory requirements. Adequately-funded recognition programs provide education, and enable fleets to demonstrate leadership and highlight new technologies to Washington's communities, organizations and citizens.
- 4) Consider reducing emissions from other sources of black soot such as woodstoves and fireplaces. By 2018, Ecology projects that diesel emissions will be 12 percent and that woodstove and fireplace emissions will be 29 percent of the PM2.5 emissions inventory, respectively.
- 5) Ensure additional state and local agency resources are available to monitor and quantify the potential climate benefits of diesel emission reduction programs. While new information continues to emerge, recent analyses suggest that the global warming potential of black carbon has been underestimated.⁶⁰ The State of Washington and local air agencies should assess new data as it becomes available.
- 6) Provide additional funding through a combination of new grant programs and tax incentives, in addition to the existing funds for diesel retrofit. The Transportation IWG recognizes that grants and loans have differing appeal and strengths. Grant funding makes money readily available for small business owners who may not have access to financial resources (e.g., loans) required to cover upfront investments. Revolving loans may be attractive to certain groups because they can make money available at low interest rates and monthly payments that may be attractive to

⁶⁰ Ramanathan V and G Carmichael, 2007.

owner/operators and other groups. For both grants and loans, the objective is to leverage private investment which might otherwise not occur due to market barriers, and not pay the full cost of retrofits for private fleets.

C) Transportation Systems Management

Background

Traffic Systems Management includes a broad array of strategies including: driver communication, incident response systems, and other approaches designed to reduce congestion on our existing network. The strategies fall into the following areas:

Active Traffic Management (ATM): The real-time variable control of speed, lane movement, hard shoulder use, and traveler information within a corridor. This strategy can be applied through:

- *Speed Harmonization / Queue Warning / Lane Control*— manage traffic flows and speeds as vehicles approach congested areas and reduce the speed of vehicles as they approach queues. In Europe this strategy has been found to reduce primary and secondary collisions; non-recurrent congestion; congestion, queuing, and improve throughput.
- *Traveler Information and Dynamic Re-Routing*— provide traveler information opportunities including travel times, ferry boat wait times, and the availability of alternative routes around incidents and congested areas. Dynamic re-routing uses modified destination guide-signs and other traveler information methods to assist drivers through alternative routes.

Traffic Management Centers: These centers provide centralized data collection, analysis, and real-time management of the transportation system. System management decisions are based on in-road detectors, video monitoring, trend analysis, and incident detection.

Traffic Signal Synchronization: The timing and operation of the traffic signal operations are synchronized to provide an efficient flow or prioritization of traffic, increasing the efficient operations of the corridor and reducing unwarranted idling at intersections. The system can also provide priority for transit and emergency vehicles. Traffic signal timing and operations are ongoing activities that need to be reviewed on a regular basis as traffic patterns change.

Arterial Traffic Management and ITS: The arterial corridors are improved to include traffic signal interconnect, video monitoring, traveler information, transit signal priority, and remote access from the Traffic Management Centers for remote monitoring and operation. The system will provide in-route traveler information via variable message signs to the traveling public. The system provides the communication infrastructure and Intelligent Transportation System (ITS) equipment necessary to provide communication to the corridors, which is the basis to provide the benefits of Traffic Management Centers, Traffic Signal Synchronization, and Traveler Information (arterial). The system will require multi-jurisdictional cooperation and include center to center communication between jurisdictions.

Managed Lanes: Lanes which have special operational characteristics and restrictions are intended to manage the operations of the lane(s). Management of the facility is typically a combination of physical design which limits access and regulation, and may include pricing. Examples are:

- *HOV Lanes*—Lane(s) exclusively used by transit, vanpools, and carpools (vehicles with a minimum number of occupants, typically a minimum of two or three).
- *Reversible Express Lanes*—Lane(s) that change directions during peak periods to manage peak demand periods.
- *Direct Access Ramps*—Highway ramps which provide direct access to a managed lane, e.g., a direct access ramp that links a HOV lane with a park and ride facility.
- *Ramp Bypass Lane*—A lane that provides priority bypass of ramp meters for vehicles.
- *Transit Only or Truck Only Lanes*—Lane(s) that are exclusively used by transit or trucks.
- *Green Lanes*—Lane(s) exclusively for vehicles which meet specified environmental impact levels.

- *Limited Access Highways*—Highways with limited access points.
- *HOT or Tolled Express Lane*—Lane(s) that charges tolls as a means of regulating access to or the use of the facility, to maintain travel speed and reliability.
- *Vessel Reservations*—Passage for vehicles purchased in advance for specific sailings.

Pricing: The use of direct user fees (tolls) to manage demand on the transportation system

- *Fixed Toll*—Toll is fixed and may vary by vehicle class or other set of variables.
- *Time of Day Schedule*—Toll varies by time of day, rising during set peak periods and lowering during non-peak periods.
- *Dynamic or Variable Toll*—Toll changes to maintain a set operation performance based on time traffic conditions. Toll would increase to reduce demand.

Increase Incident Response Opportunities: Increase the detection, assistance, and clearing of incidents on the highway to increase safety and reduce non-reoccurring delay caused by incidents.

Improve Traveler Information: Provide real time and projection of travel conditions and transit information to the public to aid in their decision about how, when and where to travel.

Increase the number of multi-modal connection points: Improve system coordination by jointly locating bus, ferry vessel, light-rail terminals in proximity to park and ride, bicycle, and pedestrian facilities.

GHG emissions reduction estimates for transportation management strategies, other than traffic signal synchronization, are difficult to identify. Each transportation strategy is designed to reduce congestion and improve travel time. Reduced congestion and improved travel times reduce the amount of idling and the length of motor vehicle emissions. The difficulty identifying GHG emission reductions is because of the assumptions that need to be made: what impacts the improvements will have on traffic, what vehicle travel speeds are before the improvements, what vehicle travel speeds are after the improvements, and the number of hours of current congestion vs. future (post improvement congestion).

Transportation Systems Management Recommendation

Transportation Systems Management Recommendation 1

Recommendation:

The Transportation IWG has augmented the work of the 2007 CAT and identified the potential GHG emissions reduction potential of transportation system management strategies. The Transportation IWG has not prioritized implementation and is not making a recommendation beyond that of the 2007 CAT.

Ideally, all transportation system management strategies would be implemented as a package in order to get the most reduction in travel times. WSDOT Traffic Operations is already implementing signal synchronization and timing efforts, managed lanes, incident response, traffic management centers and traveler information strategies. Improvements in these areas may produce significant reduction in travel times and can be implemented relatively inexpensively and quickly. Improved multi-modal connections, active traffic management and pricing strategies may also produce significant reductions in travel times, but are more expensive and will take longer to implement.

Cost Assumptions: Low cost represents cost below \$10 million; medium cost represents project costs between 10 million and \$50 million, high cost is greater than \$50 million.

Implementation Cost	GHG Emission Reduction	VMT Reduction
Strategy: <i>Speed Harmonization / Queue Warning / Lane Control</i>		
Medium to high due to significant investment in variable message	High due to ability to manage congestion by reducing queues,	Improved travel time may increase VMT. Benefit comes from reduced

signs, data stations and cameras	delay and idling vehicles	congestion and GHG emissions.
Strategy: Traveler Information and Dynamic Re-Routing		
High	Medium to high due to ability to reroute or delay trips during peak congestion or poor weather	Improved travel time may increase VMT. Benefit comes from reduced congestion and GHG emissions
Strategy: Traffic Management Centers		
Medium to high depending on whether incremental upgrades to existing TMC or capital construction of new facilities are needed	High due to ability to manage congestion by reducing queues, delay and idling vehicles	Improved travel time may increase VMT. Benefit comes from reduced congestion and GHG emissions
Strategy: Traffic Signal Synchronization		
Low to Medium	High: optimally timed traffic signals can reduce delay and unnecessary idling	Improved travel time may increase VMT. Benefit comes from reduced congestion and GHG emissions
Strategy: Arterial Traffic Management and Intelligent Transportation Systems (ITS)		
High	High due to ability to manage congestion by remote operation of arterials, reducing delay and idling vehicles, rerouting of traffic around high congestion areas	Improved travel time may increase VMT. Benefit comes from reduced congestion and GHG emissions
Strategy: High Occupancy Vehicle (HOV) Lanes		
High assuming that any further HOV lane expansion requires a capital project	Medium due to travel time improvement incentives for carpools, vanpools and transit	Medium due to travel time improvement incentives for carpools, vanpools and transit
Strategy: Reversible Express Lanes		
High assuming that any further reversible express lane expansion requires a capital project	Low demand due to significant in both directions of travel providing little travel time improvements	Low
Implementation Cost	GHG Emission Reduction	VMT Reduction
Strategy: Direct Access Ramps		
High assuming that any direct access ramp expansion requires a capital project	Medium due to travel time improvement incentives for carpools, vanpools and transit	Medium due to travel time improvement incentives for carpools, vanpools and transit
Strategy: Ramp Bypass Lane		
Medium to High cost may vary depending on the width of the ramp. If the ramp is wide, enough HOV bypass lane may be created with roadway markings	Medium due to travel time improvement incentives for carpools, vanpools and transit	Medium due to travel time improvement incentives for carpools, vanpools and transit
Strategy: Transit Only or Truck Only Lanes		
High assuming that any transit or truck lane only implementation will require a capital project	Low to Medium due to travel time improvement incentives for transit, and trucks. Truck bypass lane may reduce idling of trucks stuck in traffic congestion	High for transit only lanes due to travel time improvement incentives.
Strategy: Green Lanes		

Low to High depending on the implementation strategy. Conversion of existing HOV lanes could be done for low cost. Adding green lanes through capital project would be high cost	Low due to additional vehicles in HOV lanes operating at or near capacity may reduce HOV travel time and reliability. Migration of the green vehicles from general purpose lanes may not improve travel in the GP lanes	Low due to improvements from encouraging green vehicle use may not overcome potential additional delay in HOV or general purpose lanes
Strategy: Limited Access Highways		
Medium to High due to the cost to purchase access rights on additional routes may be significant	Low to Medium due to reducing access may improve traffic flow, reduce delay and prevent idling vehicles	Low
Implementation Cost GHG Emission Reduction VMT Reduction		
Strategy: High Occupancy Toll (HOT) or Tolled Express Lane		
Medium assuming conversion of existing HOV lanes or general purpose lanes to toll facility.	Medium due to travel time improvement, reduced delay and fewer idling vehicles.	Low due to potential reduction in vehicle trips or shift from peak periods.
Strategy: Vessel Reservations		
Low to medium depending on the system needed to process vehicle reservations	Low: may reduce some vehicle waiting and idling	Low: may prevent some trips if travelers are aware of wait times and boarding status
Strategy: Fixed Toll		
Medium assuming conversion of existing HOV lanes or general purpose lanes to toll facility	Medium due to travel time improvement, reduced delay and fewer idling vehicles	High due to reduction in vehicle trips or shift from peak periods
Strategy: Time of Day Schedule Toll		
Medium assuming conversion of existing HOV lanes or general purpose lanes to toll facility	Medium due to travel time improvement, reduced delay and fewer idling vehicles	High due to reduction in vehicle trips or shift from peak periods
Strategy: Dynamic or Variable Toll		
Medium assuming conversion of existing HOV lanes or general purpose lanes to toll facility	Medium due to travel time improvement, reduced delay and fewer idling vehicles	Medium due to reduction in vehicle trips or shift from peak periods
Strategy: Increase Incident Response Opportunities		
Low	Medium to high due to rapid removal of blocking incidents, reduction in delay and number of idling vehicles	Improved travel time may increase VMT. Benefit comes from reduced congestion and GHG emissions

Implementation Cost	GHG Emission Reduction	VTM Reduction
Strategy: Improve Traveler Information		
Low cost assuming most traveler information improvements are incremental additions to existing systems that can be implemented for less than \$10 million	Medium to high due to ability to reroute or delay trips during peak congestion or poor weather	Low to medium: may reduce trips if travelers are aware of congestion and potential travel delay
Strategy: Increase the number of multi-modal connection points		
High cost due to the need for capital projects to implement	Medium due to potential to decrease SOV trips because of better multi-modal connections	Medium due to potential to decrease SOV trips because of better multi-modal connections

Discussion Points:

- A Transportation IWG member indicated that, “signal synchronization in dense urban centers such as downtown Seattle may not benefit from signal synchronization optimized for vehicles. Reducing walk times should receive equal prioritization in such locales. An approach similar to that used by Complete Streets design methodology might be appropriate where ‘signals should be prioritized to meet the needs of the users of the corridor and not benefit one group to the significant detriment of another.’”
- A Transportation IWG member “does not agree with the implication that travel time improvements lead to either VMT or GHG reductions.”

D) Vehicle Electrification

Plug-In Hybrid Electric Vehicles (PHEVs) and Electric Vehicles (EVs) could displace petroleum with electricity, with significant potential to reduce GHG emissions and expenditures on oil imports.

In order to maximize GHG emission reductions, PHEVs and EVs must be served with electricity from sources other than fossil fuels, which means that incremental electricity demand from vehicles should be matched by increased clean energy generation. Electrifying transportation and greening the grid can be mutually reinforcing initiatives. With two-way connections to the grid, vehicles could provide energy storage and other “ancillary services” back to the grid, enabling it to accommodate more intermittent renewable energy generation.

Impact on Goals

The 2007 CAT strategy, *Acceleration and Integration of Plug-In Hybrid Electric Vehicle Use* identified a goal that by 2020, PHEVs would account for 10 percent of light-duty VMT statewide. Using the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model (v1.7), a PHEV would have 37 percent lower GHG emissions on a lifecycle basis. The cumulative GHG emission reductions estimated by this earlier analysis was 5.28 MMtCO₂e for the period 2008-2020.

The above stated GHG emission benefits are based on a very aggressive market scenario. The number of PHEVs required to equal 10 percent of registered light duty vehicles by 2020 is on the order of 590,000 vehicles, or 59,000 vehicles per year over the 10 year period. Of the 280,000 new vehicles currently sold per year, approximately 20 percent would have to be PHEVs. By comparison, the total number of hybrid electric light duty vehicles sold in the US during January 2008 was 22,392 units, or approximately 2.14 percent of the more than 1.04 million new vehicles sold in the US for that month.

Additional Benefits

Coupled with “smart charging” and “vehicle to grid” (V2G) capabilities, PHEVs and EVs could provide both back-up power for homeowners, and spinning reserve and load regulation services to the utility-wide grid. This system could also enhance the integration of intermittent renewable energy generation, like wind and solar, by utilizing PHEV batteries to provide system wide storage capability.

A number of Washington companies (Boeing, Paccar, Microsoft, V2Green) are, or have the capability of becoming, major players in creating products or components that support the development of this industry.

Costs

A cost-effectiveness value of \$380/tCO₂ was calculated for the CAT 2007 *Acceleration and Integration of Plug-In Hybrid Electric Vehicle Use* strategy. This calculation should be revisited as information on PHEV and EV costs mature.

Relationship to other Efforts

ESSHB 1303⁶¹ directed CTED to explore vehicle electrification for Washington. The City of Seattle, King County, Port of Seattle and PSCAA are conducting a year-long demonstration project testing the performance of PHEVs in urban areas. The Chelan School District is demonstrating an Original Equipment Manufacturers (OEM) diesel and electric hybrid school bus. The Advanced Vehicle Initiatives Consortium, which includes an array of public and private partners located in Chelan County, has proposed conversion of 14 Toyota Prius vehicles into PHEVs.

Industry and observer statements on PHEVs have often indicated that the production cost of these vehicles will be high. The National Renewable Energy Laboratory (NREL), in a 2006 report, found that the marginal cost of PHEV technology would be from \$12,000 to \$18,000. If these high marginal cost projections are accurate, history suggests that manufacturers will need to heavily subsidize PHEVs, at least in the first few years of production. Consequently, they are unlikely to produce more of these loss-producing vehicles than necessary. This, in turn, suggests that manufacturers are most likely to produce PHEVs and EVs only for those states that have opted-in to the Cal ZEV program where they are required (11 states right now, four more expected). Therefore, state incentives for PHEVs and EVs, which do not directly help manufacturers, may not be enough to draw them into Washington if the state does not require them through ZEV provision.

However, some industry comments indicate that at least some manufacturers plan to vie aggressively for leadership in the plug-in hybrid market. This strategy by manufacturers suggests they will be willing to internally subsidize the cost of these vehicles and would market them in Washington and other non-ZEV states. In this case, incentives could be effective on their own and the ZEV regulatory overlay is not necessary to draw them into Washington.

Vehicle Electrification Recommendations

Even since the 2007 report, electric vehicle technology has made significant strides, with major vehicle manufacturers now making significant investments in commercializing the technology, and commercial models expected to be available from OEMs in 2010. Against this backdrop, the Transportation IWG believes the most important actions for Washington are:

⁶¹ <http://apps.leg.wa.gov/billinfo/Summary.aspx?bill=1303&year=2007>

Vehicle Electrification Recommendation 1

Aligning Washington purchasing incentives to ensure that economically attractive PHEV and battery electric vehicle options are delivered to Washington consumers faster.

- Direct the Department of Licensing and the Department of Revenue to develop options that would decrease the up-front cost of purchasing PHEVs and other high mileage vehicles relative to the cost of purchasing less efficient vehicles. By helping to offset additional consumer costs for purchasing PHEVs, Washington can reduce climate pollution and reap substantial economic rewards by decreasing expenditures on imported petroleum.
- Extend the existing state sales and use tax exemption for PHEVs and EVs beyond the current sunset date of January 1, 2011, and amend the sales and use tax exemption to include heavy-duty vehicles. Beginning January 1, 2009, new passenger cars, light-duty trucks, and medium-duty passenger vehicles that utilize hybrid electric technology and have a U.S. Environmental Protection Agency estimated highway fuel economy of at least 40 miles per gallon are exempt from state sales and use tax. This tax exemption expires January 1, 2011. (Reference Revised Code of Washington 82.08.809 and 82.08.813). It is necessary to extend this tax exemption beyond the current sunset date to coincide with the production and sale of PHEVs by OEMs. In addition, heavy duty vehicles are not included in the current definition of qualifying vehicles. RCW 82.08.813 should be amended to include heavy duty vehicles, as they represent an important market for PHEV sales.

Vehicle Electrification Recommendation 2

Ensure that current Washington laws allow for new opportunities for PHEV and battery electric vehicle applications. King County Metro Transit's VanShare program, for example, provides vans for commuters to drive between ferry, train or transit terminals and their workplaces. The vans carry 7 to 15 passengers. They are parked at the work sites during the workday, and at the transportation terminals on evenings and weekends. The average daily commute distance is 12 miles; the commute may not exceed 20 miles.

The short VanShare commutes are ideal for a battery electric vehicle (BEV) demonstration project. Such a project could speed the development of BEV technology, which is in transition from lead acid to lithium batteries.

Rideshare Operations, which runs the VanShare program, is seeking opportunities to purchase, lease or partner with other organizations to test a van for VanShare use. However, no six-plus passenger BEV vans suitable for a commuter or shuttle program are being produced today. (Some BEVs are available for commercial and recreational use, and small four-passenger sedans are being used for neighborhood commutes).

Two barriers to production of large BEV vans are developments costs and Washington law that limits the gross vehicle weight (GVW) of a medium-speed electrical vehicle to 3,000 pounds. The following recommendations are intended to remove those barriers:

- Title 46 of the Revised Code of Washington currently excludes higher weight battery electric vehicles. The current weight restriction requirement should be reviewed for relevancy and, if practical, amended to include the increase in the GVW of the "medium speed electrical vehicle" from 3,000 lbs. to 4,500 lbs.
- Study possible financial incentives that might be offered to stimulate the production of six-plus-passenger vans for VanShare or shuttle programs.

Vehicle Electrification Recommendation 3

Provide financial incentives to demonstrate vehicle electrification applications. To help initiate and accelerate PHEV and battery electric vehicle purchases, PHEV and EV demonstration projects involving both public and private fleets should be supported. Demonstration projects should include all classes of vehicles and must integrate with electric utilities to ensure “smart-charging” capabilities. Heavy-duty vehicle demonstration efforts are of particular interest as displacing petroleum in large diesel vehicles yields not only GHG benefits, but also significant reductions in hazardous local pollutants, and in “black carbon” (soot) which is believed to significantly enhance greenhouse warming. School buses, drayage trucks, and other heavy duty vehicles may be good candidates.

Vehicle Electrification Recommendation 4

Integrate electric vehicles into the utility infrastructure in ways that add value to the electric power system and advance progress toward a “smart grid” that can better utilize distributed generation, storage, and demand-side solutions. PHEVs and EVs are one of many technologies that can open the pathway to a more advanced, interactive, resilient, “smart” electric power grid that improves reliability as well as environmental and economic performance. For example, if the grid could call on the storage capability of vehicle batteries, it could successfully integrate more intermittent renewable energy generation, like wind and solar. Northwest research institutions, private firms, and technology innovators are on the cutting edge of opening up this new frontier—integrating the energy capabilities of vehicles and the electric grid. Current utility incentives often discourage innovation. The region’s utilities, technology innovators, and research institutions should be actively encouraged to develop the metering, rate structures, and physical infrastructure to maximize the potential of this opportunity. For example, the Washington Utilities and Transportation Committee (WUTC) should allow rate recovery for prudently incurred expenses associated with advancing and developing new technology and practices that will accelerate deployment of PHEVs and maximize their value to the electric grid.

E) Low Carbon Fuel Standard (LCFS)

Background

In its 2007 report, the CAT recommended that Washington implement a Low Carbon fuel Standard (LCFS) that would yield 10 percent less carbon intensive motor fuel by 2020. The LCFS would be based on standards under development in California, British Columbia, and elsewhere.

The CAT recommended LCFS would reduce carbon dioxide equivalent emissions by 10 percent from the full life cycle emissions of the fuel. That means accounting for emissions from extracting, growing, producing, refining, transporting, storing, and using the fuel over its entire life. It means accounting for a high level of detail in the production process. Ethanol distilled with heat from coal would score worse than ethanol distilled with heat from lower carbon fuel such as natural gas or corn stover. In the California approach, life cycle emissions would also include the direct and indirect effects of land conversions; e.g., clearing virgin rainforest to grow palm oil. Any fuel with lower carbon emissions can be used to meet the requirements, so the LCFS creates a level playing field for biofuels, electricity, natural gas, algae derived fuels, etc.

There are alternative ways to lower carbon emissions from transportation fuels. A carbon tax, a renewable fuel standard and a cap and trade program can also accomplish this goal. While these approaches warrant continued consideration, at this time a carefully designed LCFS appears to be the most direct way to achieve reductions in life cycle carbon emissions while at the same time accommodating technology development and a wide range of fuel types. Fuel refiners expressed concern regarding the complexity arising in the California process to develop a low carbon fuel standard and that was acknowledged as a reason to keep alternatives open in the analysis of a low carbon fuel standard for Washington.

In the near term, low carbon gasoline would likely have a large amount of ethanol. Whether ethanol really yields a life-cycle carbon benefit has been hotly debated for many years. Careful review of California, EPA and other analysis on this issue will be needed. Ethanol blends of 10 percent cause higher levels of evaporative emissions of volatile organic carbons. These are a precursor to ozone. The Puget Sound area violated the EPA ozone standards in the Summer of 2008. It may be necessary to ensure that a LCFS does not worsen this ozone situation.

Section 211(c)(4) of the Federal Clean Air Act generally prevents states from setting fuel standards that are more stringent than federal regulations. Since there is no federal LCFS, however, Ecology believes there's no impediment to Washington implementing LCFS requirements by legislation or rule.

Benefits of a Low Carbon Fuel Standard

- A LCFS sets a performance standard and lets fuel providers figure out how to most effectively meet them. It's conducive to lower-cost solutions.
- A LCFS does not favor or promote specific technologies and it automatically handles changing technology well. If a new process can provide lower carbon fuel, there are no rigid barriers to prevent immediate introduction and level competition with existing fuels and processes.
- A LCFS keeps government out of having to forecast technological or economic winners, so there's less risk of mistakenly distorting markets and scientific research.
- A LCFS can address the life-cycle emissions to ensure true GHG benefits. It does not have to rely on only the carbon content of the finished product.
- A LCFS yields rapid benefits, it reduces emissions as soon as the fuel is sold and used.
- A LCFS can allow alternate ways to comply to handle uncertainty. California allows four ways:
 - Provide only fuels that meet the standard.
 - Provide a mix of higher and lower carbon fuels that, on average, meet the standard.
 - Acquire sufficient credits from other parties to meet the standard.
 - Use earned and banked credits sufficient to meet the standard.

Impacts on Goals

The 2007 CAT estimates show that a Washington LCFS could reduce 2020 annual GHG emissions by 3.6 MMtCO₂e. That is 60 percent of the reductions estimated for all the technology strategies combined. Technology strategies and VMT reduction strategies each provide about half the reductions needed from transportation.

The California approach would phase in the LCFS slowly, approximately 1 percent per year from 2011 to 2020. California has proposed a draft LCFS rule that is expected to be implemented sometime in 2009.

Additional Benefits

A LCFS is consistent with requirements to achieve use of renewable fuels. Electricity and renewable fuels (cellulosic ethanol, refinery based biofuels, biodiesel, etc.) would provide most of the GHG reductions from lower carbon fuels. The life cycle approach of the LCFS ensures real benefits from renewable fuels.

Costs

See 2007 CAT report.⁶²

Relationship to Other Efforts

⁶² http://www.ecy.wa.gov/climatechange/CATdocs/020708_InterimCATreport_final.pdf

The Energy Independence and Security Act signed in December 2007, increased national ethanol requirements substantially beyond what existed at the time of the 2007 report. Requirements went from 7.5 billion gallons in 2012 to 36 billion gallons by 2022, with corn ethanol maxed out at 15 billion gallons in 2015 and cellulosic and advanced biofuels providing the remaining 21 billion gallons. The effect of these requirements in Washington State is a bit uncertain because this is a national standard, but EPA projects that by 2013 the national average of ethanol in gasoline will be 10 percent, the level that can be burned in conventional vehicles.

EPA recently estimated that the life cycle GHG reduction from corn ethanol is 16 percent, not enough to meet a 10 percent reduced carbon requirement if ethanol is only 10 percent of the fuel. A LCFS envisions that other fuels would make up the remaining requirements or they would be met by acquiring credits from other sectors. One way or another, carbon would be lowered.

By December 2008, Washington's renewable fuel standard requires that ethanol and biodiesel constitute 2 percent, respectively, of gasoline and diesel fuel. This Summer ethanol accounted for 6 to 8 percent of gasoline. Biodiesel is still quite low at .6 percent. The Washington requirement is largely surpassed by the recent Energy and Independence Security Act requirements.

The Western Climate Initiative (WCI) has decided not to allow trading between transportation and other sectors until 2015. A cap and trade systems and a LCFS can co-exist, although they have to be carefully coordinated.

A carbon tax and a LCFS could also co-exist. British Columbia's carbon tax took effect this summer, at about 9 cents per gallon. British Columbia is also are part of the WCI cap and trade system and expect to be able to coordinate these requirements. WSU has completed a large study of ways to incentivize biofuels. Their draft analysis recommends a carbon tax for that purpose.

Low Carbon Fuel Standard Recommendations

Low Carbon Fuel Standard Recommendation 1

Recommendation:

Request the Department of Ecology, Community Trade and Economic Development, WSDOT, and other affected agencies seek resources from the 2010 legislature to evaluate and implement LCFS requirements appropriate for Washington. The Transportation IWG finds that it's critical to have sufficient resources to do this job well. A 2010 request would come after the implementation of the California LCFS and allow Washington to benefit from California's experience. If resources are provided, Ecology should undertake a two step process to assess and implement the best LCFS program for Washington.

- Step 1 would be a scoping process, coordinated with other agencies and affected parties, to assess whether the California LCFS, a modified LCFS, or alternative ways to lower carbon from motor fuel would best meet the Washington GHG reduction needs.
- Step 2 would be for Ecology, and/or other agencies, to develop rules to implement a LCFS tailored to Washington needs, provided the scoping finds that some version of an LCFS remains the best choice for Washington.

F) Adopting the Zero Emission Vehicle Part of the California Vehicle Emission Standards

Background

Since California regulated air quality emissions prior to the federal government, it was allowed to continue to regulate emissions after similar federal standards were developed. Other states are allowed to “opt-in” to the California vehicle emissions standards, which are typically more stringent than the federal equivalents, and Washington did so in 2005. The Washington legislature included California’s “carbon dioxide equivalent emission standards,” however those did not become effective because EPA denied approval to that part of the California standards. When the Washington legislature adopted the California emissions standards with ESHB 1397, it rejected the Zero Emission Vehicle (ZEV) part of requirements. The first vehicle models that must meet California emission standards are 2009 model year cars and light trucks.

Generally speaking, the ZEV requirements mandate that a particular number of vehicles that produce no air emissions are delivered and sold in a state. Though the ZEV mandate has been amended in the past, the current base California requirement is that 12 percent, 14 percent, and finally 16 percent of the vehicles sold in California in by major auto manufacturers (in 2012, 15 and 18 respectively) must be ZEVs. Because no mass market ZEVs (affordable vehicles with customary range, speed, and refueling capability) are expected to be viable for a number of years, California allows the 12 and 14 percent requirement to be met primarily by substituting large numbers of “partial ZEVs” until 2018. These substitutes can be ultra clean gasoline vehicles, hybrid electric vehicles, and neighborhood electric vehicles (limited speed and range). The “substitutes” allow fewer numbers of “true ZEVs” (full electric or fuel cell vehicles) to be delivered for sale before 2018. California ZEV regulations also give credit to manufacturers for the selling of the required number of “true ZEVs” anywhere in the United States. No extra (expensive) full electric or fuel cell vehicles, beyond what’s required directly in California, are needed for the opt-in states until after 2015. Then, the more limited range full electrics would be required in Washington (and other opt-in states).

The 2020 GHG-reduction calculated for the 2007 CAT from adopting the ZEV standards was relatively small. This result is because only a small number of true ZEVs will have filtered into the fleet by 2020 and while the ZEV substitutes still have low GHG emissions, the ZEV substitutes will largely be replacing other low emission vehicles. The 2007 analysis showed that benefits would triple from the 0.13 MMtCO₂e level by 2035, though this still results in a high cost per metric ton of GHG emissions reduction.

Current Status

California is finalizing amendments to its ZEV requirements to create a new category and credits for “plug-in hybrid” vehicles, which are now expected to become available as early as 2010 from some manufacturers. The earlier 2003 ZEV rules were based on the historic lack of breakthroughs in battery technology and the expectation that fuel cells would become viable. Under revised rules, the 16 percent ZEVs by 2018 requirement remains. The main issue is what will be required between now and 2018 when large scale substitutions of ultra-clean gasoline vehicles and hybrids are still allowed. Between 2012 and 2018, if a manufacturer maximizes their use of substitution credits, 2.2 percent to 3 percent of their sales would be “plug-in hybrids,” in addition to regular hybrids and ultra clean gasoline vehicles. Though hybrid production might have difficulty meeting the required production numbers, a maximum use of allowed substitutions for true ZEVs would result in the following distribution of clean vehicles:

Vehicle Types:	2012-14	2012-14 Number of Vehicles	2015-17	2015-17 Number of Vehicles
PZEV (ultra clean gasoline)	6%	16,800	6%	16,800
AT-PZEV (hybrids, natural gas)	3%	8,400	2%	5,600
Enhanced AT-PZEV (plug-in hybrids) and NEV (short-range, low speed electric Vehicles)	2.19%	6,132	3%	8,400
True ZEV (full electric or fuel cell)	.81	[2,268]*	3%	[4,200]*

Total ZEV Obligation:	12%	33,600	14%	35,000
Total WA new vehicle sales (2002-06)		280,000		280,000
* In 2012-14, true ZEVs are not required to be sold in Washington, though some may voluntarily be sold here. After 2014, regulations would require some true ZEVs to be placed in Washington, but numbers depend on how manufacturers comply in California.				

Relationship to Other Efforts

The Vehicle Electrification strategy of accelerating entry of electrified vehicles into the fleet is a different way to achieve a similar result, with the added benefit of including heavy duty vehicles, which are important sources to address. Vehicle Electrification would operate through tax incentives and demonstration programs. This strategy is a regulatory approach. The benefits are more certain, but the approaches are not in conflict and potentially complementary.

Also, see pro and con discussion below on market incentives that debate whether ZEV might actually be needed to enable incentive programs like Vehicle Electrification.

Discussion of Washington Adopting the ZEV Requirements

The Transportation IWG has not made a recommendation on adoption of the ZEV requirements or any alternatives. The Transportation IWG has documented its deliberations and has identified that this is a statutory issue and, if necessary, would have to be resolved by the Legislature.

The potential positive and negative results of Washington adoption of the ZEV mandate were initially debated during the 2005 adoption of California's general emissions standards. The 2008 Transportation IWG also discussed the issue, and opted not to provide a recommendation on the standard. Some members favored this strategy, others opposed it. Some of the arguments for and against Washington adopting the ZEV requirements are presented in what follows. Each major argument is given a heading to help the reader track the discussion.

Arguments for and against Adopting the ZEV Requirements

Impacts on Goals

Adopting recent ZEV amendments would increase the 2007 benefit estimates (PRO)

The 2007 CAT report indicates an annual benefit of 0.13 MMtCO₂e in 2020 from application of the ZEV requirements. In its ZEV amendments, California calculates that by 2018 GHG reductions are increased by 26 percent relative to the 2003 requirements. In Washington this improvement will be somewhat less than in California, but might be on the order of a 20 percent improvement (0.16 MMtCO₂e instead of 0.13 MMtCO₂e).

This improvement results primarily from the large number of plug-in hybrids that are used to comply. In the revised rules, they account for 90 percent of the credits in 2012-14 and 50 percent of the credits in 2015-17. Even though the revised rules result in the same overall goals to be met (equivalent of 12 percent ZEVs in 2012-14 and 14 percent ZEVs in 2015-17), the equivalency is calculated based on ozone precursors, not GHGs. It also uses complicated credit and multiplier formulas. The result is the mix of vehicles that can be used to emit less GHGs than previously. Again, it's the large numbers of plug-in hybrids accounting for this effect.

Adopting recent ZEV amendments would increase the 2007 benefit estimates (CON)

The 2007 CAT report indicates a limited net benefit of 0.13 MMtCO₂e from adoption of the ZEV mandate. Opponents note that a ZEV-qualified vehicle sold in Washington or outside of Washington will have the same potential to reduce GHG emissions, and the actual emission reduction will depend on miles driven and the driving habits of the owner. Therefore, quantifying the specific reduction from the sale of any

ZEV-qualified vehicle in a specific state will be very difficult and is unlikely to be easily evaluated for its contribution to the overall 2020 emission reduction goal. Opponents also note that while benefits might increase after 2020 if ZEVs become more generally available, such a change in the mix of the vehicles on the market would produce a benefit even in the absence of a ZEV mandate.

Adopting ZEV now brings early benefits (PRO)

In addition, benefits could start accruing in Washington as early as 2012. These early benefits are important and worth more than their magnitude suggests because of the cumulative nature of global warming. CARB estimates that 60 percent of the 26 percent improvement will occur in 2012-14. The ZEV benefit is also relative to many other strategies that depend on many more uncertainties.

Adopting ZEV now brings early benefits (CON)

Proponents argue that beginning the process now will allow manufacturers to ramp up vehicle availability in Washington State to meet this requirement rather than expecting a manufacturer to comply suddenly at a later date.

Opponents argue that consumer demand and manufacturing capacity are most effective for driving manufacturer response. They point out the current high demand for gas-electric hybrids and other fuel efficient vehicles are causing manufacturers to shift their product mix away from large vehicles to meet this new demand. Even if these vehicles are manufactured and delivered to Washington State, unless there is consumer demand, the ZEV qualified vehicles will not enter the fleet regardless of a state mandate. However, if there is consumer demand, manufacturers are likely to ship an increased number of vehicles to a state to meet that demand. Sales numbers show Washington residents already register a disproportionately large number of gas-electric hybrids compared to other states, even in the absence of a ZEV mandate, demonstrating manufacturer's willingness to respond to the market before regulatory mandates.

Additional Benefits

Fewer plug-in hybrid electrics will be delivered to Washington without the ZEV requirement (PRO)

The main benefit of opting in to ZEV is that manufacturers would be required to deliver a large number of plug-in hybrids to the state starting in the 2012-14 timeframe. The table shows that as the "Enhanced AT-PZEV" and NEV vehicles.

If Washington does not have the ZEV requirements, plug-in hybrid electrics will first be delivered to states that do have these requirements, where manufacturers need the credits. Since costs for plug-in hybrids will be higher than for conventional vehicles, without the requirement, manufacturers will mostly sell these vehicles where they can get credit for them. It's far less likely that Washington will receive plug-in hybrids, or full electric vehicles, until much later than other "opt-in" states -- even if customers want them.

Fewer plug-in hybrid electrics will be delivered to Washington without the ZEV requirement (CON)

Opponents counter that consumer demand and manufacturing capacity should likely play a greater role than regulation in manufacturer decisions on allocation of ZEV qualified vehicles for sale in a state. They point out that the current high consumer demand has generated waiting lists for new gas-electric hybrids and expected limited production of these vehicles-recognized by the credit system currently offered by many states for the sale of gas-electric hybrids anywhere in the country. In addition, opponents note that a ZEV-qualified vehicle sold in Washington or outside of Washington will have the same potential to reduce GHG emissions, and the actual emission reduction will depend on miles driven and the driving habits of the owner. Therefore quantifying the specific reduction from the sale of any ZEV-qualified vehicle in a specific state will be very difficult and is unlikely to be easily evaluated for its contribution to the overall 2020 emission reduction goal.

Postponing adoption of ZEV delays benefits (PRO)

Adopting ZEV requirements now also allows manufacturers to meet the requirements when the levels are relatively low. If Washington delays entry into ZEV requirements until later phases, manufacturers will not

be able to meet the higher requirements. They will need substantial phase-in requirements. That would delay any benefits in Washington much further than might appear when looking at the above table.

Postponing adoption of ZEV delays benefits (CON)

The market has a greater effect than regulations so it will also affect the timing more than regulations, and the benefit is remarkably small compared to the cost to consumers and the burden placed on some of Washington's small businesses.

ZEV will generate recharging infrastructure which will improve chance for sales above minimums (PRO)

While plug-in hybrids are expected to be largely re-charged at home, if they start entering Washington in large numbers, additional recharging infrastructure will be developed at places of work, retail and food outlets, and popular recreation venues. Having this infrastructure in place will greatly improve the possibility that plug-in hybrids and full electric vehicles will be sold in Washington above and beyond the regulatory minimum.

ZEV will generate recharging infrastructure which will improve chance for sales above minimums (CON)

This infrastructure does not exist at present nor have utilities, businesses, or local governments indicated a willingness to build this infrastructure before there is a clear demonstration of demand.

Initial ZEV requirements create a pathway that will speed arrival of true ZEVs (PRO)

In the long run, the base requirement that 16 percent of new sales must be true zero emission vehicles will apply. California's history of providing substitutes and alternative paths simply recognizes the need for development and transitions. The surest way for Washington to benefit from true ZEVs will be to adopt the requirements now, so manufacturers can reasonably phase in supplies to Washington. There is no way manufacturers can get from no ZEVs to 16 percent ZEVs all at once. The ZEV requirement is the transition path.

The short-term benefit is getting the plug-in hybrid electrics as early as possible. The regulations incentivize the more expensive full-electrics being placed in California. Depending on market conditions and how manufacturers comply with California requirements, full electrics are most likely to start arriving in Washington in 2015. If costs allow, some may arrive in the 2012-2014 period.

Initial ZEV requirements create a pathway that will speed arrival of true ZEVs (CON)

Opponents believe that market forces will be more important than the regulations in determining how and when true ZEVs will arrive in Washington.

Market based alternative to ZEV proposed by opponents (PRO)

Proponents believe that T-12 may be needed to make incentive approaches like the opponent proposal (similar to vehicle electrification) work. It's clear that the cost of plug-in hybrids will be much higher than for comparable vehicles. Manufacturers may not produce more than is required. Even if prices appear comparable due to manufacturer cost spreading (internal subsidizing), it seems unlikely that manufacturers will turn-out more of those loss-producing vehicles than necessary. This suggests that manufacturers are most likely to produce plug-in hybrids only for those states that have opted-in to the Cal ZEV program where PHEVs are required (11 states right now, four more expected). Consequently tax incentives alone may not pull electric vehicles into Washington as desired. The T-10, T-12 combination would be beneficial.

Market based alternative to ZEV proposed by opponents (CON)

Opponents of the ZEV mandate also proposed an alternative that harnesses existing consumer behavior to produce GHG emissions reductions. Texas has adopted a vehicle scrapping program, which provides lower income residents with a sales tax credit for scrapping an older vehicle determined to be a high emitter and replacing it with a newer vehicle with a more environmentally conscious profile. Similar efforts are underway in California, which has a \$1000 tax credit available and continues to experiment with broadening the impact and coverage of their program

This approach does not force national manufacturers to gamble on particular technologies, does not saddle dealers with vehicles with little consumer demand, and can be tailored to help consumers who are least able to upgrade their vehicles, all while still providing GHG and particulate matter emission reductions. By way of a contemporary GHG example, replacing even a relatively recent 2002 Kia Spectra with a 2007 Kia Spectra would result in a 1.5 ton reduction in CO₂ emissions each year.

Encouraging turnover of the fleet more quickly speeds the adoption of all new vehicle technology and takes advantage of the increased fuel efficiency and GHG emission reduction of almost all newer vehicles. Rather than creating a regulatory mandate that, at best, only affects a very miniscule percentage of the vehicle fleet in the state, a broad incentive would produce more substantial emissions reductions and would still allow consumer demand to drive the introduction of advanced technology vehicles promising even more dramatic emissions reductions.

Costs

The revised California requirements are much less costly than 2003 requirements (PRO)

The revised ZEV program is much less expensive than the earlier program which was expected to be met by fuel cell vehicles. California estimates that the costs from 2012 to 2017 of the revised regulations are 53 percent less than current requirements. The 2007 cost estimate for T-12 should be halved. By 2017, costs are estimated at \$900 million annually in California. Washington new car sales are about 1/5 of California's, so costs here would reduce more or less accordingly.

The reason costs are lower is that the revised ZEV program drastically cuts the required number of full electric or fuel cell vehicles (90 percent less in 2012, 50 percent less in 2015). The plug-in hybrids and other substitute vehicles are far less expensive, even though batteries needed for plug-in hybrids are likely to remain expensive at least until 2015.

The revised California requirements are much less costly than 2003 requirements (CON)

The costs of ZEV regulations remain very high, especially in light of the small amount of benefits obtained.

Risk of increased costs to auto dealers (PRO)

A concern over ZEV has been that auto dealers, who must buy the vehicles from manufacturers, would be stuck with high priced electric vehicles they could not sell without substantial discounting, i.e. losses. There are several reasons this risk may not be as great as it seems.

The most expensive vehicles will be "true ZEVs" (full electric or fuel cell vehicles). None of those vehicles are required in Washington until 2015. Even then, only the least expensive types (under 100 mile range) would be required in Washington. For those, manufacturers only get one credit for delivering them to a dealer. The other 1.5 or 2.0 credits are based on actual sale. History in California is that manufacturers want those other credits and will subsidize the prices to get them, thus reducing dealer risk.

Regarding the large number of plug-in hybrids that would be required, manufacturer comments in California have implied that some large manufacturers plan to compete very hard to become the leader in plug-in sales. It's believed they will subsidize the high battery cost across all their vehicle sales to achieve this goal. This reduces risk to dealers.

Risk of increased costs to auto dealers (CON)

Regardless of regulatory credit structure or speculations about manufacturer pricing behavior, the bottom line is that ZEV forces dealers to assume considerable financial risk. If consumers do not want these vehicles because of price, performance limits, or any other reason, it's the dealer who gets stuck with the bill.

Other Impacts

Improved likelihood that innovative “system” approaches will be developed in Washington (PRO)

The ZEV requirement will also make it more likely that recent innovative “system approaches,” purchased electric vehicles and leases for batteries and electricity, would be introduced in Washington. This leasing approach averages the high battery costs with the low electricity cost to create an affordable lease that could bring tens of thousands of electric vehicles into the area rapidly.

Improved likelihood that innovative “system” approaches will be developed in Washington (CON)

This innovative approach is in its infancy and may or may not prove viable in the long term.

The infrastructure and innovative aspects of this technology will create “green jobs” (PRO)

New technologies create new jobs. The infrastructure development and innovative systems associated with electric vehicles can generate good “green” jobs for Washington.

The infrastructure and innovative aspects of this technology will create “green jobs” (CON)

Creation of these jobs is highly speculative and there is a very limited automotive manufacturing base from which the state can build. Other states with larger vehicle markets and existing automotive manufacturing operations are more likely to see the creation of these jobs.

Appendices

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Appendix 2 – Transportation Pricing Research

Transportation Value Pricing Options and Implementations in the US¹

CONVERTING HIGH-OCCUPANCY VEHICLE (HOV) LANES TO HIGH-OCCUPANCY TOLL (HOT) LANES

"HOT" is the acronym for "High Occupancy/Toll". On HOT lanes, low-occupancy vehicles are charged a toll, while High-Occupancy Vehicles (HOVs) are allowed to use the lanes for free or at a discounted toll rate. HOT lanes create an additional category of eligibility for travelers wanting to use HOV lanes, since drivers can be eligible to use the facility either by meeting its minimum passenger requirement, or by choosing to pay a toll to gain access to the HOV lane.

Under SAFTEA-LU, HOV to HOT conversions were mainstreamed. This project type will now be implemented under 23 U.S.C. 166.

- CALIFORNIA: HOT Lanes on I-15 in San Diego
- CALIFORNIA: I-680 SMART Carpool Lanes in Alameda County
- CALIFORNIA: HOT Lanes on I-880 in Alameda County
- COLORADO: HOT Lanes on I-25/US 36 in Denver
- FLORIDA: HOT Lanes on I-95 in Miami-Dade County
- MINNESOTA: HOT Lanes on I-394 in Minneapolis
- TEXAS: HOT Lanes on I-10 and US 290 in Houston
- WASHINGTON: HOT Lanes on SR 167 in the Puget Sound Region

CORDON TOLLS

Cordon tolls are fees paid by motorists to drive in a particular area, usually a city center. Some cordon tolls only apply during peak periods, such as weekdays. This can be done by simply requiring vehicles driven within the area to display a pass, or by tolling at each entrance to the area.

- CALIFORNIA: Area Road Charging and Parking Pricing in San Francisco
- FLORIDA: Cordon Pricing in Lee County

FAIR LANES

"FAIR" lanes stands for "Fast and Intertwined Regular" lanes. Multiple freeway lanes are separated, typically using plastic pylons and striping, into two sections: "fast" lanes and "regular" lanes. The fast lanes would be electronically tolled express lanes, where tolls could change dynamically to manage demand. In the remaining unpriced lanes, drivers whose vehicles were equipped with transponders would be compensated with credits that would be based on the tolls in effect at the time they traveled, and would be established at a percentage of the toll rate.

- CALIFORNIA: FAIR Lanes with Dynamic Ridesharing in Alameda County

PRICING ON EXISTING LANES

- MINNESOTA: Priced Dynamic Shoulder Lanes

Converting narrow bus-only shoulder lanes along the Interstate to wider priced dynamic shoulder lanes (PDSLs), and moving these lanes from the right-most to the left-most portion of the roadway to minimize conflict with entering vehicles.

¹ Information culled from the FHWA Value Pricing Project Quarterly Reports – January through March 2008, http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/pubs_reports/quarterlyreport/qrt1rpt08/index.htm

- WASHINGTON: Proposed Variable Priced Tolls on SR 520 in Seattle
Introduce new tolls on SR-520, setting toll rates on the facility based upon demand so as to avoid the build up of congestion and the loss of roadway capacity when it is most needed. Toll rates will be communicated in real-time, and revenues from tolling will be used to help finance the bridge replacement.

PRICED NEW LANES

Priced new express lanes involve tolls on added lanes that vary by time-of-day and are collected at highway speeds using electronic toll collection technology. Tolls may be set "dynamically," i.e., they may be increased or decreased every few minutes to manage demand so as to ensure that the lanes are fully utilized, yet remain uncongested.

- CALIFORNIA: Express Lanes on State Route 91 in Orange County
- CALIFORNIA: I-15 Managed Lanes in San Diego
- CALIFORNIA: Dynamic Pricing on SR 91 in Orange County
- CALIFORNIA: Violation Enforcement System on I-15 Managed Lanes in San Diego
- CALIFORNIA: HOT Lanes on State Route 1 in Santa Cruz County
- COLORADO: Express Toll Lanes on C-470 in Denver
- FLORIDA: Priced Queue Jumps in Lee County
- FLORIDA: I-95 Priced Managed Lanes in Miami-Fort Lauderdale Region
- GEORGIA: Express Toll Lanes on I-75 in Atlanta
- GEORGIA: I-75 South HOT/Truck-Only Toll (TOT) Study in Atlanta
- MARYLAND: Express Toll Lanes on Section 100 of the I-95/JFK Expressway in Baltimore
- MARYLAND: Express Toll Lanes on Section 200 of the I-95/JFK Expressway in Baltimore
- NORTH CAROLINA: HOT Lanes on I-40 in Raleigh/Piedmont Triad
- OREGON: Express Toll Lanes on Highway 217 in Portland
- TEXAS: Value Priced Express Lanes on I-10 in San Antonio
- TEXAS: HOT Lane Enforcement and Operations on Loop 1 in Austin
- TEXAS: Express Toll Lanes on the LBJ Freeway in Dallas
- TEXAS: HOT Lanes on the Katy Freeway in Houston
- TEXAS: Express Toll Lanes on I-30/Tom Landry in Dallas
- TEXAS: Express Toll Lanes on I-35 in San Antonio

PRICING ON TOLL FACILITIES

Pricing on toll facilities involve tolls on congested toll facilities that are varied by time of day with the intention of encouraging some travelers to use the roadway during less congested periods, to shift to another mode of transportation, or to change routes. With less people traveling during congested periods, the remaining peak period travelers will have decreased delays. To be eligible for the variable toll programs, vehicles must be equipped with transponders, which are read by overhead antennas.

- CALIFORNIA: Peak Pricing on the San Joaquin Hills Toll Road in Orange County
- FLORIDA: Pricing on Bridges in Lee County
- FLORIDA: Value Pricing on the Sanibel Bridge and Causeway in Lee County
- FLORIDA: Variable Tolls on the Sawgrass Expressway in Broward County
- FLORIDA: Variable Tolls for Heavy Vehicles in Lee County
- FLORIDA: Pricing Options on the Florida Turnpike in Miami-Dade County
- GEORGIA: Variable Pricing Institutional Study for the GA-400 in Atlanta
- ILLINOIS: Illinois Tollway Value Pricing Pilot Study
- NEW JERSEY: Variable Tolls on the New Jersey Turnpike

- NEW JERSEY: Variable Tolls on Port Authority Interstate Crossings
- NEW JERSEY: Express Bus/HOT Lane Study for the Lincoln Tunnel
- NEW JERSEY: Upgrade of Electronic Toll Collection Technology in New York
- PENNSYLVANIA: Variable Tolls on the Pennsylvania Turnpike
- TEXAS: Truck Traffic Diversion Using Variable Tolls in Austin

USAGE-BASED VEHICLE CHARGES

Usage-based vehicle charges include mileage-based charges for insurance, taxes, or leasing fees; and car sharing; Pay-As-You-Drive (PAYD) Automotive Insurance is a usage-based charge that converts automotive insurance from a fixed to a per mile cost, providing a financial incentive to drive less.

- CALIFORNIA: Car Sharing in the City of San Francisco
- FLORIDA: Dynamically Priced Carsharing in Tampa
- GEORGIA: Simulation of Pricing on Atlanta's Interstate System
- MINNESOTA: Variabilization of Fixed Auto Costs
- MINNESOTA: Mileage-Based User Fee Regional Outreach Statewide
- OREGON: Mileage-Based Road User Fee Evaluation
- WASHINGTON: Global Positioning System (GPS) Based Pricing in the Puget Sound Region. (Study completed by PSRC)
- WASHINGTON: Pay-As-You-Drive (PAYD) Insurance in Seattle, fall 2008

"CASH-OUT" STRATEGIES/PARKING PRICING

Parking Cash-Out is a strategy that involves employers offering their employees the option of receiving taxable cash in lieu of free or subsidized parking provided by the employer. Employees may deny the cash and keep the tax-free parking subsidy or accept tax-free transit or vanpooling benefits in its place-with any balance in taxable cash. Car cash-out involves paying households to use one less car for a certain period of time. It helps people review their transportation choices and see how travel by foot, bicycle, transit, and ridesharing is competitive with the private automobile. The goal is to show people that they can save money and simplify their lives by not owning a second - or even first - car.

- CALIFORNIA: Car Share Innovations in the City of San Francisco
- CALIFORNIA: Smart Parking Initiative in San Diego
- MINNESOTA: Parking Pricing Demonstration in the Twin Cities Area
- WASHINGTON: Parking Cash-Out and Pricing in King County
- WASHINGTON: Cash-Out of Cars in King County

REGIONAL PRICING INITIATIVES

Road pricing strategies that include comprehensive area - or region-wide applications that evaluate pricing's effect on reducing congestion, altering travel behavior, and encouraging the use of other transportation modes. Region-wide pricing applications that use technologies that provide drivers with real-time congestion and pricing information on alternative routes are especially encouraged.

- CALIFORNIA: Investigation of Pricing Strategies in Santa Clara Valley
- FLORIDA: Sharing of Technology on Pricing
- ILLINOIS: Comprehensive Pricing in Northeast Illinois
- MARYLAND: Feasibility of Value Pricing
- MINNESOTA: FAST Miles in the Twin Cities
- MINNESOTA: Project Development Outreach and Education

- TEXAS: Regional Value Pricing Feasibility Study in Dallas
- TEXAS: HOT Lane Network Evaluation in Houston
- VIRGINIA: Regional Network of Value Priced Lanes
- VIRGINIA: Value Pricing for the Hampton Roads Region
- WASHINGTON: Tolling Strategies in the Seattle Area

TRUCK ONLY TOLL FACILITIES

Truck only toll (TOT) lanes are highway lanes that are reserved for the use of commercial vehicles, primarily trucks and buses. Commercial vehicles can pay a fee to use the lanes if so desired, or they can continue to use the regular lanes. Further, fees are only charged when necessary to manage the performance of the lanes. TOT lanes can either be newly constructed facilities, or they can be created by reallocating the use of existing lanes. Similar in concept to HOT lanes, the pricing strategy for TOT lanes corresponds to a cost per mile that will keep the TOT lanes performing at a level of service that provides more reliable travel.

- CALIFORNIA: Analysis of Environmental Effects of PierPASS and Dedicated Truck Lanes in Southern California
- GEORGIA: Northwest Truck Tollway

Transportation Value Pricing Projects in the United States²

CONVERTING HIGH-OCCUPANCY VEHICLE (HOV) LANES TO HIGH-OCCUPANCY TOLL (HOT) LANES

"HOT" is the acronym for "High Occupancy/Toll". On HOT lanes, low-occupancy vehicles are charged a toll, while High-Occupancy Vehicles (HOVs) are allowed to use the lanes for free or at a discounted toll rate. HOT lanes create an additional category of eligibility for travelers wanting to use HOV lanes, since drivers can be eligible to use the facility either by meeting its minimum passenger requirement, or by choosing to pay a toll to gain access to the HOV lane. Under SAFTEA-LU, HOV to HOT conversions were mainstreamed. This project type will now be implemented under 23 U.S.C. 166.

***CALIFORNIA: HOT Lanes on I-15 in San Diego**

What: San Diego's HOT Lanes were originally approved as part of the FHWA'S Congestion Pricing Pilot Program in ISTEA-1991.

Where: In the median between the junction of I-15 and SR 163 south and I-15 and SR 56 junction north

Extension plan calls for 20 miles between SR 163 and SR 78 of 4 lanes in the median, moveable barrier, multiple access points, direct access ramps for buses and an eventual BRT lane.

Method: Initial pricing via collecting tolls via monthly permits with a decal in the window (December 1996); subsequently, the FasTrak[®] electronic toll collection system in use today was implemented in April 1998. Under this program, customers in single-occupant vehicles (SOVs) pay a toll each time they use the Interstate 15 HOV lanes. The unique feature of this program is that tolls vary dynamically with the level of congestion on the HOV lanes.

Fees: Fees can vary in 25-cent increments as often as every six minutes to help maintain free-flow traffic conditions on the HOV lanes. Motorists are informed of the toll rate changes through variable message signs located in advance of the entry points. The normal toll varies between \$0.50 and \$4.00. During very congested periods, the toll can be as high as \$8.00. Pricing is based on maintaining a LOS "C" for the HOT facility.

Public Support: San Diego Association of Governments (SANDAG) conducts periodic outreach to measure public response to the value pricing concept. These efforts have revealed broad support for managed/HOT lanes through the years. Equity was not perceived to be a major obstacle to implementing pricing on HOT lanes in the San Diego region.

Web Page: <http://www.sandag.org/index.asp?projectid=34&fuseaction=projects.detail>

CALIFORNIA: I-680 SMART Carpool Lanes in Alameda County

What: Examined options for the I-680 corridor and the feasibility study is complete. It concluded that the proposal to utilize the planned high-occupancy vehicle (HOV) lanes on Interstate 680 as high-occupancy toll (HOT) lanes is financially, operationally, and physically feasible. Project bid packages were in preparation in May of 2008.

² Information culled from the FHWA Value Pricing Project Quarterly Reports – January through March 2008, http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/pubs_reports/quarterlyreport/qrt1rpt08/index.htm

* Projects funded by the FHWA Value Pricing Pilot Program

Where: Southbound HOV lane to a combined HOT facility on a 14-mile segment of I-680 in Alameda County, CA. The I-680 corridor connects employees in Southern Alameda County and the Silicon Valley with homes in the Tri-Valley, East Contra Costa County and the San Joaquin Valley.

Who: The Alameda County Congestion Management Agency (CMA) in collaboration with Santa Clara Valley Transportation Authority, Caltrans, and the Metropolitan Transportation Commission

Public Support: Environmental advocacy groups, business and labor organizations, and the metropolitan planning organization, Metropolitan Transportation Commission supports the project.

For More Information Contact: Jean Hart, Deputy Director, Alameda County Congestion Management Agency; Phone (510) 836-2560; Fax (510) 836-2185; E-mail: jhart@accma.ca.gov.

***CALIFORNIA: HOT Lanes on I-880 in Alameda County Study**

What: A study was done to determine whether excess capacity does exist, whether there is a market among potential users, and how to address the physical and operational issues associated with such a plan. Study results indicated that, while excess capacity exists, it is not sufficiently high to make local officials comfortable that additional priced vehicles could be accommodated. Also, the demand by light duty commercial vehicles was perceived as modest, and the

Where: Interstate 880 is a major congested freeway in Alameda County. Project is located on 17 miles of highway from just south of Oakland to Fremont. It connects the Port of Oakland and Oakland International Airport with high technology companies in Santa Clara and southern Alameda counties and with goods distribution centers to the east. This corridor has the highest volume of truck traffic in the region.

Public Support: California Highway Patrol expressed strong reservations about its ability to conduct effective enforcement.

Web Page: <http://www.680smartlane.org/>

For More Information Contact: Jean Hart, Deputy Director, Alameda County Congestion Management Agency; Phone (510) 836-2560; Fax (510) 836-2185; E-mail: jhart@accma.ca.gov.

COLORADO: HOT Lanes on I-25/US 36 in Denver

What: The I-25 HOV/tolled Express Lanes opened in June 2006, marking the first time solo drivers could legally access the existing HOV lanes (along I-25 from US 36 into downtown) by paying a toll.

Where: The I-25 Bus/HOV lanes, also known as Downtown Express lanes, consists of a two-lane barrier-separated reversible facility in the median of I-25 between downtown Denver and 70th Avenue, a distance of 6.6 miles.

* Projects funded by the FHWA Value Pricing Pilot Program

Purpose: The purpose of the I-25 Express Lanes is not to generate revenue but rather to cover expenses such as maintenance and snow removal that was previously paid for by taxpayers.

Fees: Toll rates for the I-25 Express Lanes vary by time of day to ensure the lanes remain free-flowing. Toll collection is electronic only, with an EXpressToll® transponder. No cash is accepted.

Project Status: The number of vehicles paying a toll to travel in the I-25 Express Lanes during the first quarter of 2008 was 103,257 in January, 103,646 in February, and 98,689 in March. Toll revenues of \$215,232 in January, \$190,945 in February, and \$202,335 in March were collected, exceeding each month's projection of \$161,600.

For More Information Contact: Peggy Catlin, Colorado Department of Transportation, 4201 East Arkansas Avenue, Suite 260, Denver, Colorado 80222; Phone (303) 757-9208; E-mail: peggy.catlin@dot.state.co.us.

FLORIDA: HOT Lanes on I-95 in Miami-Dade County

What: The study evaluated adding a new lane in the median of I-95. A moveable zipper barrier would permit multiple lane configurations of between two and three HOT lanes in the peak direction. The additional lanes would use the two existing HOV lanes. The HOT lanes would allow multiple ingress and egress points.

Where: FDOT is planning a Pilot Project to provide Managed Lanes on I-95, from I-395 in Miami-Dade County, to I-595 in Broward County.

Who: The Florida Department of Transportation (FDOT) conducted a preliminary feasibility study

Method: It is anticipated that this pilot will introduce Managed Lanes to commuters on the I-95 corridor while also generating net revenues to help finance the project.

Fees: The 95 Express lanes will have variable congestion pricing, or tolls, that fluctuate with increased congestion so that an operating speed of 50 MPH can be maintained. Transit (buses) and registered high occupancy vehicles with three or more people (HOV-3) could use the 95 Express lanes at no cost. Additionally, all other vehicles will be allowed to enter the 95 Express lanes by paying a toll with the use of SunPass. In addition to toll revenue supporting the cost of the project, FDOT is proposing to allocate a portion of the tolls to support the operation of Bus Rapid Transit on the corridor.

Web Page: <http://www.95express.com>.

For More Information Contact: Kenneth Jeffries, Office of Planning FDOT, District 6; Phone (305) 470-6736; Fax (305) 470-6737; E-mail: ken.jeffries@dot.state.fl.us.

MINNESOTA: HOT Lanes on I-394 in Minneapolis

What: Converts the existing high occupancy vehicle (HOV) lane on I-395 into the state's first high occupancy toll (HOT) lane, *MnPASS lane*. The first phase of the project opened in May 2005. Two sections, east section - two reversible lanes, barrier separated. West section - one lane in each direction with double-white stripes separating HOT lane from general purpose lane. Policy sets speed on lanes above 55 miles per hour, 95 percent of the time.

Where: I-395 from Highway 101 to I-94 in Minneapolis, MN

Method: Lanes are dynamically priced

Fees: Lanes remain free to HOVs and motorcyclists during peak hours, and are free to all users in off-peak periods

Project Update: Phase II planning for I-394 MnPASS is underway. Planning includes facility design concepts, land use and urban design analysis, transit advantages, telecommuting, and outreach and education.

For More Information Contact: Kenneth R. Buckeye, Program Manager Value Pricing; Phone (651) 366-3737; E-mail: kenneth.buckeye@dot.state.mn.us.

****TEXAS: HOT Lanes on I-10 and US 290 in Houston***

What: Houston's "QuickRide" pricing program was implemented on existing HOV lanes of I-10, also known as the Katy Freeway in January 1998. It was implemented on US 290 in November 2000.

Where: HOV Lanes on I-10 and US 290 in Houston, TX

Method: The HOV lanes are reversible and restricted to vehicles with three or more persons during the peak hours of the peak periods. The pricing program allows a limited number of two-person carpools to buy into the lanes during the peak hours.

Fees: Participating two-person carpool vehicles pay a \$2.00 per trip toll while vehicles with higher occupancies continue to travel free. Single-occupant vehicles are not allowed to use the HOV lanes.

Project Status: The final report has been completed. Reports and findings may be found at <http://houstonvaluepricing.tamu.edu/reports>.

For More Information Contact: David Fink, Transportation Operations Engineer, Texas Department of Transportation; Phone (713) 881-3063; E-mail: dfink1@houstontranstar.org.

****WASHINGTON: HOT Lanes on SR 167 in the Puget Sound Region***

What: The State Route (SR) 167 High-Occupancy Toll (HOT) Lanes Pilot Project is a four year pilot project that will convert the existing HOV lanes on SR 167 within King County/Seattle, Washington to HOT lanes without expansion of the existing freeway.

Where: Nine miles on SR 167 from Southwest 15th Street in Auburn, WA to I-405 in Renton, WA

Method: Toll rates increase and decrease with the level of congestion to ensure that traffic in the HOT lane always flows freely and carpools enjoy the same fast and reliable trip they have in HOV lanes.

Fees: The State Transportation Commission established the minimum toll rate at \$0.50 and maximum toll rate at \$9.00. The Washington State Legislature approved the rates and the Governor signed the bill.

* Projects funded by the FHWA Value Pricing Pilot Program

Web Page: <http://www.wsdot.wa.gov/Projects/SR167/HOTLanes/>.

For More Information Contact: Patty Rubstello, Project Manager, Washington State DOT;
Phone (425) 450-2720; E-mail: rubstep@wsdot.wa.gov.

CORDON TOLLS

Cordon tolls are fees paid by motorists to drive in a particular area, usually a city center. Some cordon tolls only apply during peak periods, such as weekdays. This can be done by simply requiring vehicles driven within the area to display a pass, or by tolling at each entrance to the area.

***CALIFORNIA: Area Road Charging and Parking Pricing in San Francisco**

What: The goal of this proposal will be to implement the first area-wide parking pricing pilot and lead to the first national implementation of an area road pricing pilot.

The City proposes a two-pronged approach:

- 1) implement priced parking at the metered spaces (this is already implemented at city-owned garage facilities); and
- 2) develop a plan to implement area road pricing within 2 years.

Where: San Francisco, CA

Method: Still in study phase

Web Page: www.sfmobility.org

For More Information Contact: Zabe Bent, Senior Transportation Planner, San Francisco County Transportation Authority; E-mail: elizabeth.bent@sfcta.org or.

FLORIDA: Cordon Pricing in Lee County

What: The Town was awarded a grant to study the feasibility of introducing a new variable toll at both approaches to the Town. The Lee County Board of Commissioners approved a one year trial period for implementing One-Way Tolls on the Cape Coral and Midpoint Memorial Bridges. The trial period started November 1, 2007. One-Way Tolling is being studied as a way to make Lee Way more efficient to reduce operating expenses and to facilitate changes to improve traffic flow at the toll plazas.

Where: The island community of Fort Myers Beach in Lee County, Florida. Access to the Town is provided by road at two points of entry

Method: Project in study phase

FAIR LANES

"FAIR" lanes stands for "Fast and Intertwined Regular" lanes. Multiple freeway lanes are separated, typically using plastic pylons and striping, into two sections: "fast" lanes and "regular" lanes. The fast lanes would be electronically tolled express lanes, where tolls could change dynamically to manage demand. In the remaining unpriced lanes, drivers whose vehicles were equipped with transponders would be compensated with credits that would be based on the tolls in effect at the time they traveled, and would be established at a percentage of the toll rate.

***CALIFORNIA: FAIR Lanes with Dynamic Ridesharing in Alameda County**

What: The study focused on limited eligibility FAIR lanes, which would provide credits for low-income travelers in the corridor. The study was completed in August 2005. The name of the study was changed to HOT/Credit (HOT/C) Lanes to better reflect the focus of the effort to provide credit for low income travelers in the general purpose congested lane to be used for the HOT/C lane.

Where: Interstate 580 and the "Sunol Grade" portion of Interstate 680; connector ramps at the I-580/I-680 interchange near the Dublin-Pleasanton Bay Area Rapid Transit (BART) station.

Method: Dynamic ridesharing enables travelers to respond to pricing in flexible ways that traditional ridesharing and transit options do not. It uses web-based and telephone-based systems to allow users to find carpool partners on a "real-time" basis, close to the time that travel is needed. In addition to cost and time savings (due to free use of express lanes), dynamic ridesharing would be further facilitated with reserved premium parking spaces at participating BART stations, on-demand backup services, and in-station electronic information screens providing necessary details about individual ride matches.

Public Support: Polling indicated that HOT/C was not well supported by the public.

Web Page: The final Evaluation Report is available on the CMA's web site www.accma.ca.gov

For More Information Contact: Elizabeth Walukas, Senior Transportation Planner, Alameda County CMA; Phone (510) 836-2560 extension 26; Fax (510) 836-2185; E-mail: bwalukas@accma.ca.gov.

PRICING ON EXISTING LANES

MINNESOTA: Priced Dynamic Shoulder Lanes

Priced Dynamic Shoulder Lanes – Converting narrow bus-only shoulder lanes along the Interstate to wider priced dynamic shoulder lanes (PDSLs), and moving these lanes from the right-most to the left-most portion of the roadway to minimize conflict with entering vehicles.

What: The Twin Cities Metropolitan Area, encompassing Minneapolis and St. Paul, will be converting narrow bus-only shoulder lanes along the northbound portion of Interstate 35W between 46th Street and downtown Minneapolis to wider priced dynamic shoulder lanes (PDSLs), and will be moving these lanes from the right-most to the left-most portion of the roadway to minimize conflict with entering vehicles.

Where: The plan is for the PDSLs to link up with new, dynamically-priced high-occupancy toll (HOT) lanes on Interstate I-35W, created by converting the existing high-occupancy vehicle (HOV) lanes which extend from approximately I-494 to the Burnsville Parkway, and also to extend these HOT lanes through the Crosstown Commons between I-494 and 46th Street. The end result will then be a new 15-mile, dynamically-priced managed-lane corridor,

* Projects funded by the FHWA Value Pricing Pilot Program

speeding bus and HOV trips and also providing motorists a new option to experience a fast and reliable trip.

Fees: Buses and high-occupancy vehicles will operate at no charge in the PDSLs with access allowed during peak times to single-occupant vehicles whose drivers are willing to pay the toll, with prices set to ensure free-flow travel.

For More Information Contact: Nick Thompson, UPA Project Manager, MnDOT, phone (651) 234-7728, email Nick.Thompson@dot.state.mn.us

***WASHINGTON: Variable Priced Tolls on SR 520 in Seattle**

Variable Priced Tolls on SR 520 in Seattle – Introduce new tolls on SR 520, setting toll rates on the facility based upon demand so as to avoid the build up of congestion and the loss of roadway capacity when it is most needed. Toll rates will be communicated in real-time, and revenues from tolling will be used to help finance the bridge replacement.

What: The plan is to introduce new tolls on SR 520 setting toll rates on the facility based upon demand so as to avoid the build up of congestion and the loss of roadway capacity when it is most needed. Toll rates will be communicated in real-time, and revenues from tolling will be used to help finance the bridge replacement.

Where: SR-520 between I-5 in Seattle and I-405 in Bellevue, WA

Method: The project is to deploy "open road" electronic toll collection equipment, allowing tolls to be collected at freeway speeds. Tolls will be collected using in-vehicle transponders, with supplemental automatic cameras to read license plates for vehicles not equipped with transponders.

For More Information Contact: Patty Rubstello, Urban Planning Office, Washington State DOT, (206) 464-1299, rubstep@wsdot.wa.gov

PRICED NEW LANES

Priced new express lanes involve tolls on added lanes that vary by time-of-day and are collected at highway speeds using electronic toll collection technology. Tolls may be set "dynamically," i.e., they may be increased or decreased every few minutes to manage demand so as to ensure that the lanes are fully utilized, yet remain uncongested.

***CALIFORNIA: Express Lanes on State Route 91 in Orange County**

What: The 91 Express Lanes opened in December 1995 as a four-lane toll facility in the median of a 10-mile section of the state route – Riverside / 91 freeway.

Where: 10-mile section of the Riverside / 91 freeway in Orange County.

Method: Toll revenues have been adequate to pay for construction and operating costs. The toll lanes are separated from the general purpose lanes by a painted buffer and plastic channelizers. All vehicles must have a "FasTrakTM" transponder to travel on the express lanes

* Projects funded by the FHWA Value Pricing Pilot Program

* Projects funded by the FHWA Value Pricing Pilot Program

Fees: In the toll schedule effective July 2007, tolls on the express lanes vary between \$1.20 and \$9.50, with the tolls set by time of day to reflect the level of congestion delay avoided in the adjacent free lanes, and to maintain free-flowing traffic conditions on the toll lanes. Vehicles with three or more occupants travel free except when traveling Eastbound, Monday through Friday between the hours of 4:00 p.m. and 6:00 p.m., when they pay 50 percent of the regular toll. This policy also applies to individuals on a motorcycle. Other toll discount offers are extended to zero-emission vehicles and vehicles with disabled person's license plates.

Study Completed: The project was completed in 2000. Study Results can be accessed at <http://ceenve.calpoly.edu/sullivan/sr91/sr91.htm>.

For More Information Contact: Kirk Avila, Toll Road & Motorist Services; Phone (714) 560-5988; E-mail: kavila@octa.net.

CALIFORNIA: I-15 Managed Lanes in San Diego

What: I-15 HOT Lanes described above in the "Converting HOV Lanes to HOT Lanes" section are being extended to create a 20-mile "Managed Lanes" facility. A four-lane facility in the median with a moveable barrier, multiple access points from the regular highway lanes, and direct access ramps for buses from five transit centers. A high frequency bus rapid transit (BRT) system is under development and will replace the existing express buses that serve the corridor. Project is in three phases. The first stage adds eight miles directly abutting the existing 8-mile reversible HOT lanes and latter stages will be added in 2011 and 2012.

Where: In the median of I-15 between SR 163 and SR 78.

Method: Applying dynamic tolling through a skewed, per-mile rate. The distance-based fares will fluctuate based on the value of travel time saved between the managed lanes and adjacent general purpose lanes, and from the level of congestion in the managed lanes. The toll system will read vehicles upon entry and exit to calculate the toll rate. When complete, the new state-of-the-art system will collect tolls from over 30 locations covering 82 "tolled lanes".

Study Report: The I-15 Managed Lanes Value Pricing Planning Study was completed in 2002 and project deliverables are available at:
<http://www.sandag.org/index.asp?projectid=34&fuseaction=projects.detail>

Web Page: More details on the project are available at www.keepsandiegomoving.com and www.sandag.org/index.asp?rfpid=127&fuseaction=rfps.detail

For More Information Contact: Derek Toups, San Diego Association of Governments; Phone (619) 699-1907; E-mail: dto@sandag.org.

****CALIFORNIA: Dynamic Pricing on SR 91 in Orange County***

What: Study and implement dynamic pricing on SR 91 in Orange County

Where: SR 91 in Orange County

For More Information Contact: Kirk Avila, Toll Road & Motorist Services; Phone (714) 560-5988; E-mail: kavila@octa.net.

* Projects funded by the FHWA Value Pricing Pilot Program

CALIFORNIA: Violation Enforcement System on I-15 Managed Lanes in San Diego

What: San Diego Association of Governments (SANDAG) is studying the feasibility of applying state-of-the-art violation enforcement systems (VES) to improve accuracy in verifying vehicle passenger counts and enforcing HOV and toll provisions of the future I-15 Managed Lanes.

Where: I-15 in San Diego

Method: Elements of the VES study will be integrated into, the FasTrak[®] electronic toll collection system for the I-15 Managed Lanes. Other more advanced approaches would require proof-of-concept testing which may be conducted on the existing barrier-separated reversible HOT lanes subsequent to the deployment of the I-15 Managed Lanes toll system in 2008. The VES will utilize a combination of technology and business rules for the effective processing of HOT-lane violators.

Final Report: The [I-15 Managed Lanes Violation Enforcement Study Report](http://www.sandag.org/index.asp?projectid=67&fuseaction=projects.detail)
<http://www.sandag.org/index.asp?projectid=67&fuseaction=projects.detail>

Web Page: The I-15 Managed Lanes web page:
<http://www.sandag.org/index.asp?projectid=34&fuseaction=projects.detail>

For More Information Contact: Derek Toups, San Diego Association of Governments;
Phone: (619) 699-1907; E-mail: dto@sandag.org.

****CALIFORNIA: HOT Lanes on State Route 1 in Santa Cruz County***

What: A five-mile section of State Route 1 is proposed for widening. The facility is currently a four-lane divided freeway. Within the study corridor limits there are seven interchanges. Five HOT lane alternatives were studied in detail, including:

- (1) one lane in each direction with barrier separation, no intermediate access;
- (2) one lane in each direction, with buffer separation, no intermediate access;
- (3) one lane in each direction with striped separation, 1 or 2 intermediate access points;
- (4) one lane in each direction with striped separation, continuous access; and
- (5) one reversible lane with barrier separation, no intermediate access

Based on the study results, in June 2002, the Regional Transportation Commission voted not to include a HOT lane alternative in further consideration, however it did select a carpool lane alternative with a footprint that would allow conversion to a HOT lane at a future date, should demand warrant it.

Where: Santa Cruz County

Final Report: The Final Report is available on the Santa Cruz County Regional Transportation Commission's web site <http://www.sccrtc.org/highway.html>.

Study Completed: There are no additional activities expected on this project.

For More Information Contact: Karena Pushnik, Santa Cruz County Regional Transportation Commission; Phone: (831) 460-3210; E-mail:
karena.pushnik@co.santa-cruz.ca.us.

***COLORADO: Express Toll Lanes on C-470 in Denver**

What: A feasibility study was recently completed which evaluated the design, operational and financial feasibility, and expected public acceptance of Express Lanes on the 26-mile C-470 beltway in the southwest part of the Denver metro area.

Where: C-470 is a four-lane beltway between I-70 and I-25 with 18 interchanges.

Method: The concept studied is a four lane barrier-separated facility in the median of four general purpose lanes would manage volumes in the Express Lanes by charging a variable toll to ensure reliable, free-flowing traffic conditions.

Study Completed: The C-470 Express Lanes Feasibility Study Final Report is available. Go to www.c470.info for updated information.

Project Status: The environmental assessment is on hold due to local government opposition.

For More Information Contact: Ron Buck, Colorado Department of Transportation; Phone: (303) 972-9112; E-mail: ron.buck@dot.state.co.us.

FLORIDA: Priced Queue Jumps in Lee County

What: A feasibility study of Queue Jumps in Lee County, Florida. The feasibility analysis indicated that while queue jumps did not appear to be a good candidate for traditional toll bond financing, they are nonetheless financially feasible. A Queue Jump is a facility that can be used to bypass points on the transportation network where congestion is particularly severe and occurs in a predictable pattern.

Where: Highway and arterial intersections in Lee County, Florida

Method: Tolls would vary by time of day and would be levied electronically, and would be tied in with the County's existing ETC system. A significant characteristic of queue jumps is their ability to generate revenue for needed roadway improvements while simultaneously contributing to travel demand management.

Public Support: The analysis has shown favorable public acceptance

For More Information Contact: Sarah Clarke, Lee County Department of Transportation; Phone: (239) 533-8718; E-mail: sclarke@leegov.com.

***FLORIDA: I-95 Priced Managed Lanes in Miami-Fort Lauderdale Region**

What: Creating a 21-mile managed-lane facility on I-95 in the Miami-Ft. Lauderdale region. A single HOV lane into two high-occupancy toll (HOT) lanes in each direction by narrowing the travel lanes from 12' to 11' and narrowing the shoulders. Anticipated completion will be June 2009.

The longer-term plan is to convert the flat-rate tolls on the limited-access expressways in South Florida to variable rates based on travel demand. Over half of such expressways are currently tolled.

* Projects funded by the FHWA Value Pricing Pilot Program

Where: I-95, between I-395 in Dade County (Miami area) and I-595 Broward County (Fort Lauderdale area)

Method: Variable pricing will be applied based upon demand and the network itself will be used as the back-bone of a bus rapid transit (BRT) system which will be subsidized through the toll revenues. Toll rates will be adjusted as often as every three minutes in order to maintain free-flowing conditions on the managed lanes at least 90 percent of the time.

For More Information Contact: [I-95 Managed Lanes Pilot Project](#)

***GEORGIA: Express Toll Lanes on I-75 in Atlanta**

What: The project evaluated the feasibility of implementing value pricing concepts and Bus Rapid Transit in the I-75 corridor in the Atlanta area.

Where: I-75 south corridor in Atlanta area, that extends from I-285 south to SR 16 near the City of Jackson in Butts County.

Project Completed: The final report http://srta-valuepricing.net/i75_south/i75_south.htm is available on the State Road Toll Authority web site at www.georgiatolls.com. Managed lanes with pricing will definitely be implemented on I-75 through Atlanta. The project is currently projected to take place in 5-7 years because new lanes must be built to permit the priced lanes.

For More Information Contact: Patrick Vu, Senior Transportation Consultant, State Road and Tollway Authority; Phone: (404) 893-6130; E-mail: patrickvu@georgiatolls.com.

***GEORGIA: I-75 South HOT/Truck-Only Toll (TOT) Study in Atlanta**

What: The High Occupancy Toll (HOT) Lanes Feasibility Study sought to identify corridors where HOT Lanes Facilities would provide congestion relief and enhance safety and efficiency to justify their installation in the Atlanta Metropolitan Area.

The Truck Only Toll (TOT) Lanes Feasibility Study sought to examine whether the concept of optional truck only facilities would provide congestion relief and enhance safety and efficiency to justify their installation in the Atlanta Metropolitan Area. The proposal included elements to improve the travel demand model to address pricing of truck travel, and to conduct market research and other activities.

Where: I-75 South in the Atlanta area.

Project Completed: Both the HOT and TOT Studies were finalized as of July 2005. The final report is available: [TOT Final Report](#). More information on the HOT/TOT Study can be found at: <http://www.hotandtotstudy.com/>

Web page: http://srta-valuepricing.net/i75_south/i75_south.htm

For More Information Contact: Patrick Vu, Senior Transportation Consultant, State Road and Tollway Authority; Phone: (404) 893-6130; E-mail: patrickvu@georgiatolls.com.

* Projects funded by the FHWA Value Pricing Pilot Program

MARYLAND: Express Toll Lanes on Section 100 of the I-95/JFK Expressway in Baltimore

What: Value Pricing Pilot Program amended to evaluate the possible implementation of variable tolls on selected state highways and toll facilities in the State of Maryland. Study facilities that have the potential to provide a comprehensive approach to making improvements to congested facilities that would allow MDOT to reduce travel delays and offer premium service.

Where: A Value Pricing Pilot program Toll Agreement was executed between the Federal Highway Administration, the Maryland Department of Transportation, and the Maryland Transportation Authority (MdTA) to authorize the collection of tolls on the new Express Toll Lanes (ETLs) on the I-95/JFK Expressway in Baltimore.

Project Status: This project did not receive Value Pricing Pilot (VPP) program funds; however the project received FHWA approval to toll the facility through the VPP program. Construction began on the first I-95 ETLs section, the Rossville Boulevard overpass, in November 2005. Mainline construction began in Fall 2006. It is anticipated that the project will be completed in late 2011.

For More Information Contact: Melissa Williams, Planning Manager, Maryland Transportation Authority-Capitol Planning Division; Phone: (410) 537-5651; E-mail: mwilliams9@mdta.state.md.us.

MARYLAND: Express Toll Lanes on Section 200 of the I-95/JFK Expressway in Baltimore

What: The I-95 Section 200 Project Planning Study began in the fall of 2005. Three alternatives are currently being considered; they include the No-Build, General Purposes Lanes and Express Toll Lanes (ETLs) alternatives adding ETLs to approximately a 10-mile stretch of I-95 in Baltimore.

Where: A 10-mile stretch of I-95 / JFK Expressway in Baltimore. The Section 200 ETLs would be immediately north of the Section 100 ETLs, providing a total of nearly 20 miles of ETLs.

Web Page: [I-95 Section 200 Project Web page](#)

Project Status: This project is currently in the project planning phase. Approval of the final environmental document is anticipated in Fall 2008.

For More Information Contact: Melissa Williams, Planning Manager, Maryland Transportation Authority-Capitol Planning Division; Phone: (410) 537-5651; E-mail: mwilliams9@mdta.state.md.us.

NORTH CAROLINA: HOT Lanes on I-40 in Raleigh/Piedmont Triad

What: HOT lanes and other potential value pricing options are being explored on I-40 in North Carolina.

Where: HOT lanes and other potential value pricing options are being explored on I-40 in North Carolina's Piedmont (Greensboro, High Point, and Winston-Salem) and Research Triangle (Raleigh and Durham) areas.

Study Completed: The study was completed in October 2005. The report was finalized.

For Additional Information Contact: Mustan Kadibhai, NCDOT; Phone: (919) 508-1819;
E-mail: mkadibjai@dot.state.nc.us.

***OREGON: Express Toll Lanes on Highway 217 in Portland**

What: The Highway 217 Corridor Study in the Portland area developed and evaluated several rush hour toll and ramp meter bypass alternatives in this corridor, including consideration of FAIR lanes among other value pricing approaches at ramp meters. A prior study, the Traffic Relief Options study, evaluated value pricing in the Portland metro area from a regional perspective and recommended that value pricing be considered whenever major new highway capacity is added.

Where: The highway 217 corridor, which connects I-5 to US 26, is the major north-south transportation route in the Washington County portion of the Portland metropolitan area.

Web Page: [Highway 217 Corridor Study](#).

Study Completed 2005: Phase one and two of the studies were completed using Value Pricing funds. Study findings are available at the study web site: [Hwy 217 Study Final Recommendations](#)

For More Information Contact: Ms. Bridget Wieghart, Metro Project Manager; Phone: (503) 797-1775; E-mail: wieghartb@metro.dst.or.us.

TEXAS: Value Priced Express Lanes on I-10 in San Antonio

What: Examine the use of value pricing on I-10 in the San Antonio area. The study will consider use of tolling for demand management and public acceptability of tolling; integrate value pricing with financial and mobility goals; and establish baseline travel characteristics for development of future monitoring and evaluation plans

Where: Examine the use of value pricing on I-10 on a 19-mile segment between SH 1604 and SH 46.

For More Information Contact: Judy Friesenhahn, Planning Engineer, Texas Department of Transportation; Phone: (210) 615-5814; E-mail: jfriesenhahn@dot.state.tx.us.

TEXAS: HOT Lane Enforcement and Operations on Loop 1 in Austin

What: Enforcement and Operations study for HOT Lane on the Mopac Expressway (Loop 1) in the Austin area. . The Loop 1 HOT lane is envisioned as a facility that will provide a high level of service and travel time advantages for express bus/BRT, vanpools and carpools while allowing paying Single Occupant Vehicles to use the lane. It is also envisioned that the HOT lane will be actively managed according to an operational plan that triggers changes in price in order to maintain free flow conditions for express bus/BRT. This study would develop an enforcement and operations strategy for this facility.

Where: The Loop 1 corridor in Austin, TX extends from State Highway (SH) 45 in southern Travis County to Farm-to-Market (FM) 734 (Parmer Lane) in Northern Travis County.

Project Status: Work on the project was officially suspended in early February 2008 due to TxDOT budgetary constraints.

* Projects funded by the FHWA Value Pricing Pilot Program

Web Page: Project information can be found at www.MoPac1.org.

For More Information Contact: Mark Herber, Texas Department of Transportation, Phone: (512) 832-7077, E-mail: mherber@dot.state.tx.us; Ginger Gooden P.E., Phone: (512) 467-0946, E-mail: G-goodin@tamu.edu.

TEXAS: Express Toll Lanes on the LBJ Freeway in Dallas

What: The Project includes:

- Adding managed HOV lanes to I-635 from Luna Road to the High Five including full reconstruction of I-635 from I-35E to the High Five (the I-635 West Section)
- Adding elevated managed HOV lane connectors along I-35E from Loop 12 to I-635 (the Loop 12/ I-35E Section)
- Adding operational improvements on the I-635 managed HOV lanes within the High Five (the I-635/US 75 interchange)

A key aspect of the approved project is that the two sections of the east-bound and west-bound express lanes will be located below grade in some combination of u-wall, cantilevered, straddle or tunnel segments to maintain TxDOT's and the region's commitment to "No Higher, No Wider" than what has been previously approved in the public involvement phase.

Where: The LBJ Freeway (I-635) is the major circumferential roadway in the Dallas region. The total length of the corridor is 21 miles. The base initial project is along I-635 from US 75 heading west to I-35E and then southbound along I-35E to the I-35E/LP 12 split.

Method: Currently, the West Section facility consists of eight general-purpose lanes and one HOV lane in each direction. The facility will be upgraded with up to six managed lanes (three in each direction). The proposed lane configuration would vary - the West Section would have six express lanes, the East Section from US-75 to I-30 would vary from having four express lanes (two in each direction) to having two reversible lanes to I-30. The LBJ express lane project design uses variable tolling to provide free-flowing traffic conditions and connections to transit centers to support Bus Rapid Transit (BRT).

Web Page: Additional project information can be found at the project web site: <http://www.635project.com>.

Project Status: This project received approval for FHWA *Express Lane Demonstration (ELD)* program funds in March of 2008.

For More Information Contact: John Hudspeth, P.E. CDA/Tollway Office; Phone: (214) 320-4490; E-mail: jhudsp1@dot.state.tx.us.

TEXAS: HOT Lanes on the Katy Freeway in Houston

What: The I-10 / Katy Freeway in and around Houston, TX is proposed to be expanded to eight general-purpose lanes, four in each direction, with continuous three-lane frontage roads in each direction. In addition, in the center of the facility from I-610 west to State Highway 6, four HOT lanes are proposed, two in each direction. From State Highway 6 to the Grand Parkway, two HOT lanes are proposed, one in each direction.

Where: Katy Freeway (I-10), in the western portion of Houston. The existing freeway is 23 miles long and consists of six general-purpose main lanes (three in each direction), with two-lane continuous one-way frontage roads in each direction for most of its length.

Additionally, the freeway has an one-lane reversible high occupancy vehicle (HOV) lane between I-610 and State Highway 6, and one HOV lane in each direction between State Highway 6 and the Grand Parkway (State Highway 99).

Project Status: The Katy Freeway HOT Lanes project did not receive Value Pricing funds, however the project obtained the authority to toll through the Value Pricing Program in 2002. Construction continues and toll operations are slated to begin in the late Summer or early Fall of 2008.

For More Information Contact: David Fink, Texas Department of Transportation; Phone: (713) 881-3063; E-mail: dfink1@houstontranstar.org.

TEXAS: Express Toll Lanes on I-30/Tom Landry in Dallas

What: The project opened in August 2007 as an interim "Managed HOV Lane". The project is initially operating in HOV only mode. It will transition to "Express Lanes" with pricing in later phases as the tolling infrastructure is constructed. The I-30 project features will include; dual declaration lanes, dynamic pricing and extended operating hours. The features proposed for I-30 are also being proposed on other facilities in the Dallas / Ft. Worth region and likely other parts of Texas.

Where: I-30 / Tom Landry freeway in the Dallas / Fort Worth region

Project Status: To find out what the ultimate project looks like go to: (www.keepitmovingdallas.com) click on 2006 Public Hearings for I-30 (Scroll a bit to view the presented and approved schematics).

For More Information Contact: Matthew MacGregor, P.E., Texas Department of Transportation; CDA/Tollway Director Dallas District; Phone: (214) 319-6571; E-mail: mmacgre@dot.state.tx.us.

TEXAS: Express Toll Lanes on I-35 in San Antonio

What: TxDOT evaluated managed lane options for a 15-mile section of I-35 in San Antonio, TX. The project evaluated potential operating strategies, including value pricing, which could be used as tools to manage travel demand on I-35. The team evaluated alternative pricing scenarios that could be utilized to allow certain user groups into the managed lanes at different stages over the facility's life.

Where: A 15-mile section of the Northeast Corridor (I-35) in San Antonio, TX

Public Support: the political climate in the area is unfavorable toward tolling and the project involves a large portion of elevated roadway adding considerable expense

Project Completed: The road will probably be tolled in some form once it is completed and responsibility for the project has been turned over to the Regional Mobility Authority, the local tolling agency. Selection of an alternative is not anticipated for at least 5 years because the political climate in the area is unfavorable toward tolling and the project involves a large portion of elevated roadway adding considerable expense.

For More Information Contact: Judy Friesenhan, Planning Engineer, Texas Department of Transportation; Phone: (210) 615-5814; E-mail: jfrieese@dot.state.tx.us.

PRICING ON TOLL FACILITIES

Pricing on toll facilities involve tolls on congested toll facilities that are varied by time of day with the intention of encouraging some travelers to use the roadway during less congested periods, to shift to another mode of transportation, or to change routes. With less people traveling during congested periods, the remaining peak period travelers will have decreased delays. To be eligible for the variable toll programs, vehicles must be equipped with transponders, which are read by overhead antennas.

CALIFORNIA: Peak Pricing on the San Joaquin Hills Toll Road in Orange County

What: Peak pricing was employed on this six-lane toll road facility to reduce congestion. Currently, the toll road is near capacity during peak periods.

Where: The San Joaquin Hills Toll Road (State Route 73) is 15 miles long and extends from Interstate 405 in Costa Mesa near Fairview Avenue through the San Joaquin Hills to its southern terminus of Interstate 5 in San Juan Capistrano.

Fees: A small peak period premium of 25 cents was implemented at the mainline plaza in February 2002. This was increased to 50 cents in July 2005 and to 75 cents in July 2006. The premium was designed to reduce congestion and spread peak demand to shoulder and off-peak periods, while maintaining revenues at levels required to maintain the covenants on the Agency's revenue bonds.

Project Status: It carries in excess of 2.3 million vehicles monthly (2.7 million annual average) on a six-lane facility. Currently the Toll Road is near capacity during peak periods.

Project Completed: The project team submitted their draft final report to FHWA. Despite toll increases of 50 cents at peak and 25 cents off-peak at the mainline plaza implemented on July 3rd, 2006, traffic volumes continued to grow at about 1-2% each year. In March 2007, fiscal year-to-date toll revenue growth increased over 8.6% from last year while traffic was up 1.2%.

For More Information Contact: David Lowe, San Joaquin Hills Transportation Corridor Agency; Phone: (949) 754-3488; E-mail: lowe@sjhtca.com.

FLORIDA: Pricing on Bridges in Lee County

What: In August 1998, Lee County implemented a value pricing strategy on two toll bridges between the cities of Ft. Myers and Cape Coral.

Where: Lee County, Florida

Method: The project created a peak/off-peak pricing structure offering bridge users a discount toll during times before and after the peak traffic periods.

Fees: Under the pricing plan, a fifty percent toll discount was provided for trips made during the half-hour period before the morning peak of 7:00-9:00 a.m. and in the two-hour period following the morning peak. In the evening, the discount period is during the two hours before the evening peak of 4:00-6:30 p.m. and during the half hour after the peak.

Study Completed: This project was originally funded with Congestion Pricing Pilot Program funds. Information on the project study results along with final reports can be accessed at the following web site www.leewayinfo.com. This successful Value Pricing Pilot Program (VPPP) project is still operating.

For More Information Contact: Kris Cella, Cella & Associates, Inc., Phone: (239) 337-1071, E-mail: kcella@cella.cc or Chris Swenson, P.E., CRSPE, Inc., Phone: (239) 573-7960, E-mail: crs@crspe.com; Scott Gilbertson, Director, Lee County Department of Transportation, Phone: (239) 479-8580, E-mail: gilbersm@leegov.com.

FLORIDA: Value Pricing on the Sanibel Bridge and Causeway in Lee County

What: This project will study lowering tolls prior to the morning peak and just after it, as well as studying a mid-morning toll differential. This project also offers a toll credit component for motorists willing to travel during off-peak hours.

Where: Sanibel Bridge and Causeway in Lee County, Florida

For More Information Contact: Eileen Price, Lee County Department of Transportation; Phone: (239) 533-8507; E-mail: EPrice@leegov.com.

FLORIDA: Variable Tolls on the Sawgrass Expressway in Broward County

What: In May 2003, Florida began a pilot project to combine Open Road Tolling and Value Pricing entitled *Sawgrass Expressway: A Study of New Technologies*. Open Road Tolling (ORT) utilizes electronic toll collection to create a tolled highway system free from toll plazas and delays. The project evaluates the potential for utilizing Value Pricing on the Sawgrass Expressway as a travel demand management strategy. It also documents the evaluation of the traffic impacts associated with the widening of the Sawgrass Expressway from four to six lanes from Atlantic Boulevard to the Turnpike Mainline and removing the two Mainline Toll Barriers

Where: Sawgrass Expressway, Broward County, Florida

Method: There would be no toll plazas, tollbooths, or lane restrictions. All traffic would operate at highway speeds, yet every vehicle would pay a toll. Toll collection would occur through equipment located on overhead gantries. Eliminating the toll plazas themselves and the merging and weaving that occur while entering and exiting the plazas enhances roadway capacity and safety. Customers with a transponder would already have a pre-paid account with the toll agency. The toll charge would be automatically debited from their accounts. Value Pricing could be utilized during heavily congested peak periods along the corridor.

Study Completed: The final report, *Sawgrass Expressway: Study of New Technologies* is not available electronically. You can access a copy of the project summary at: [PRICING ON TOLL FACILITIES - FLORIDA: New Technologies along the Sawgrass Expressway in Broward Co.](#)

There are no plans to implement the variable toll project at this time on the Sawgrass Expressway. But the agency believes variable tolls will be implemented at a future time. The main issue preventing variable tolling is the lack of collection facilities.

As of June 2007, the first entirely electronic toll plaza in the Turnpike system is set to open in 2016 on Highway 589

For More Information Contact: Randy Fox, AICP - Turnpike Planning Manager; Phone: (407) 264-3041; E-mail: Randy.Fox@dot.state.fl.us.

FLORIDA: Variable Tolls for Heavy Vehicles in Lee County

What: The on-going Variable Pricing Program in Lee County (see "Pricing on Bridges in Lee County") was restricted to light duty vehicles. This project expands the existing program to allow three plus axle vehicles to participate in the program and encourages them to travel during off-peak times.

Where: Lee County, Florida

Study Completed: The project was implemented in December 2003. The monitoring and evaluation study was completed in February 2005. The Final Report Executive Summary and Table of Contents can be accessed on the FHWA Highway Community Exchange Web site at: [Expansion of Variable Pricing to Heavy Vehicles -- Final Report](#)

For More Information Contact: Kris Cella, Cella & Associates, Inc., Phone: (239) 337-1071, E-mail: kcella@cella.cc or Chris Swenson, P.E., CRSPE, Inc., Phone: (239) 573-7960; E-mail: crs@crspe.com; Scott Gilbertson, Director, Lee County Department of Transportation, Phone: (239) 479-8580, E-mail: gilbersm@leegov.com.

FLORIDA: Pricing Options on the Florida Turnpike in Miami-Dade County

What: The Florida Turnpike Enterprise recently completed a study of the feasibility of implementing value pricing on an extension of the Florida Turnpike.

Where: A 21-mile section of the Homestead Extension of Florida's Turnpike (HEFT) in Southwest Miami-Dade County. The project was divided into two unique and distinct segments. The southern segment extends from SR 874 to SR 836. It is approximately eight miles long and includes four interchanges. The northern segment extends from SR 836 to I-75. It is approximately 13 miles long and includes six interchanges.

Study Completed: The study recommended widening the HEFT from six to eight lanes in the short-term. The long-term recommendation (by 2010) was to add two reversible, elevated, value-priced Express Lanes. The recommendation for the northern segment was to widen from four to six lanes in the short-term. The long-term recommendation was to add an additional four value-priced express lanes at ground level by 2015.

There are currently no plans to implement value pricing on the Homestead Extension of the Florida Turnpike (HEFT). Like the Sawgrass Expressway project, the elimination of cash payments for tolls is the largest obstacle being faced. The installation of automated toll collection systems is not currently planned, but may be considered in the future as technology advances

For More Information Contact: Randy Fox, Turnpike Planning Manager; Phone: (407) 264-3041; E-mail: Randy.Fox@dot.state.fl.us.

GEORGIA: Variable Pricing Institutional Study for the GA-400 in Atlanta

What: The State Road and Toll Authority (SRTA) will study the institutional challenges and feasibility of moving from a fixed-priced toll to a variably priced toll system using GA-400 as a case study. The major tasks of the proposal include thorough examination of the Toll Authority's internal processes and procedures; legal, contractual & bond covenants; conceptual traffic & revenue forecasts necessary to meet financial obligations; and development of an implementation plan. The study will produce reports identifying key issues as well as model documents for other toll authorities considering similar conversions. The

study will identify issues facing toll authorities considering changing from a fixed toll to a variable toll policy, as well as develop model documents.

Where: Georgia state highway 400 in the Atlanta area.

Project Status: The study team has completed preliminary data analysis for the toll plaza optimization alternative. The next steps for this study are to finalize educational materials and processing of survey results for incorporation into a final study report. This study is scheduled to be complete within the current fiscal year.

For More Information Contact: Patrick Vu, Senior Transportation Consultant, State Road and Tollway Authority; Phone: (404) 893-6130; E-mail: patrickvu@georgiatolls.com.

ILLINOIS: Illinois Tollway Value Pricing Pilot Study

What: A value pricing pilot project is being conducted on the Illinois State Toll Highway Authority (Illinois Tollway) system. Phase 1 was designed as a basic feasibility study and evaluation of possible value pricing options. This included identification of alternative pricing strategies, extensive market research, and traffic and socioeconomic impact analysis.

The new toll rates went into effect and variable pricing was introduced in January 2005. The Tollway is now evaluating the impacts of the new toll rate structure. The original idea of this study was to test a value pricing strategy on a portion of the system on a pilot basis. This possible pilot test has in effect been replaced by a system-wide implementation of a limited value pricing approach.

Where: The eastern portion of the I-88 Ronald Reagan Memorial Tollway (formerly the East-West Tollway) from Illinois 31 to the Tri-State Tollway (I-294) a distance of 23 miles is the section chosen for the pilot project study. The Illinois Tollway operates 274 miles of interstate tollways in twelve counties in northern Illinois including the Chicago suburban area.

Fees: A summary of the new toll rate structure is as follows: For passenger car users the structure provides a strong incentive for participation in the electronic toll collection program that is called I-PASS on the Illinois Tollway. There was no toll increase for drivers using I-PASS, while tolls were doubled for drivers using cash to pay the toll. Time of day pricing was instituted for commercial vehicles. All commercial vehicles traveling overnight (10 pm to 6 am) receive a discount on tolls. Commercial vehicles using I-PASS traveling off-peak on weekdays and on weekends also receive a discount.

Project Completed: The Illinois Tollway approved a comprehensive ten-year Congestion-Relief Plan on September 30, 2004. This plan includes a toll rate structure that incorporates some of the value pricing concepts included in this study. Results of the analysis were presented in a poster session at the Transportation Research Board Annual Meeting in January 2006. The project is essentially complete. A final report is nearing completion and will be issued shortly.

For More Information Contact: Eugene Ryan, Wilbur Smith Associates, Phone: (630) 434-8111 extension 107, E-mail: eryan@wilbursmith.com; or Dean Mentjes, Mobility Engineer, FHWA, Phone: (217) 492-4631, E-mail: dean.mentjes@fhwa.dot.gov.

NEW JERSEY: Variable Tolls on the New Jersey Turnpike

What: The Turnpike's variable pricing program began in the fall of 2000.

Where: The New Jersey Turnpike Authority operates a 148-mile facility with 28 interchanges

Method: The program provides for tolls that are about twelve percent higher during peak traffic hours than during off-peak periods for users of the electronic toll collection system. The price differential is scheduled to increase in a phased manner over several years.

Study Completed: The final report can be accessed from the FHWA Highway Community Exchange Web site at: [PRICING ON TOLL FACILITIES - NEW JERSEY: Variable Tolls on the New Jersey Turnpike](#).

Study Findings: The average trip delay was reduced by about 3-18 percent from 2000 to 2001 after the concurrent introduction of E-ZPass and the first phase of the time of day pricing program. The major reason for this reduction was, however, observed to be the reduction in toll plaza delays due to the introduction of E-ZPass.

It was also observed that there was no increase in toll plaza delays despite the increase of traffic volumes from 2001 to 2003. This was due to the increase in the percentage of E-ZPass users over the years. Simulation analyses showed that between 2000 and 2001 there was a reduction in vehicle emission levels as high as 10.7 percent. After 2001 a slight increase in emissions was observed due to the increasing demand, which can be interpreted as an expected outcome given the relationship among the demand, delays and emissions.

For More Information Contact: Kaan Ozbay, Ph.D., University Principal Investigator, Rutgers University; Phone: (732) 445-2792; Fax: (732) 445-0577; E-mail: kaan@rci.rutgers.edu.

****NEW JERSEY: Variable Tolls on Port Authority Interstate Crossings***

What: The Port Authority of New York and New Jersey (PANYNJ) adopted a variable toll strategy for users of the electronic toll collection system (E-ZPass) in March 2001.

Where: PANYNJ's Interstate Crossings

Fees: The Port Authority provides a 20 percent (\$1.00) discount for off-peak tolls on its bridges and tunnels crossing the Hudson River between New York and New Jersey. Peak toll rates are effective on weekdays from 6-9 a.m. and 4-7 p.m., as well as on weekends from 12 Noon to 8 p.m.

Study Completed: The final report was completed in March 2005. It can be accessed on the FHWA Highway Community Exchange Web site at: [PRICING ON TOLL FACILITIES - NJ/NY: Variable Tolls on Port Authority Interstate Vehicle Crossings](#).

For More Information Contact: José Holguín-Veras, Ph.D., P.E., Associate Professor, Rensselaer Polytechnic Institute, 110 8th Street Building JEC 4030, Troy NY 12180-3590; E-mail: jhv@rpi.edu or Mark F. Muriello, Assistant Director, Tunnels Bridges and Terminals Department, The Port Authority of New York and New Jersey, One Madison Avenue - 5th Floor, New York, NY 10010; E-mail: mmuriello@panynj.gov.

NEW JERSEY: Express Bus/HOT Lane Study for the Lincoln Tunnel

What: The Port Authority of New York and New Jersey (PANYNJ) is advancing this project to assess the feasibility of pricing a new managed lane intended to connect the New Jersey Turnpike and New Jersey highways to the Lincoln Tunnel and the Port Authority Bus Terminal in Midtown Manhattan.

* Projects funded by the FHWA Value Pricing Pilot Program

The project will assess options of pricing the excess capacity of a second Bus Lane in a High-Occupancy Toll (HOT) Lane application. The objective of this project is to determine whether value pricing might be used to allow non-bus traffic to use the excess capacity of a potential second Exclusive Bus Lane on NJ Route 495 leading to the Lincoln Tunnel and Midtown Manhattan.

On weekdays from 6-10 a.m., the PANYNJ currently operates a 2.5-mile eastbound contra-flow Exclusive Bus Lane (XBL) along the westbound Route 495 approach to the Lincoln Tunnel from the New Jersey highway interchanges. Since the XBL has reached its capacity, the PANYNJ is assessing the physical and operational feasibility of adding a second priority bus lane to the corridor.

Where: PANYNJ's Lincoln Tunnel

Project Update: An interim report of these findings is in the final stages of development and will be available during the second Quarter of 2008.

For More Information Contact: Mark Muriello, PANYNJ, Assistant Director; Phone: (212) 435-4836; E-mail: mmuriello@panynj.gov.

NEW JERSEY: Upgrade of Electronic Toll Collection Technology in New York

What: The Port Authority of NY & NJ's (PANYNJ) implemented time-of-day pricing in March 2001 at the six tunnels and bridges that connect New Jersey and New York City. This project will undertake a technology and market assessment of equipment and systems that can accommodate cashless toll transactions at a level of accuracy that is currently provided by the existing cash and E-ZPasssm system; assess the operational challenges and financial risks of implementing such a system; and possibly determine the potential to deploy such a system in both the New York-bound and New Jersey-bound travel directions in order to facilitate more meaningful congestion charging rates and traffic management incentives in the current non-tolled direction

Where: The Port Authority of NY & NJ's (PANYNJ) six tunnels and bridges that connect New Jersey and New York City.

Project Update: Planning for the overall toll system replacement project was formally authorized by the PANYNJ Board on June 26, 2007.

For More Information Contact: Mark Muriello, PANYNJ, Assistant Director; Phone: (212) 435-4836; E-mail: mmuriello@panynj.gov.

PENNSYLVANIA: Variable Tolls on the Pennsylvania Turnpike

What: The project involved a study of the potential for value pricing strategies to alleviate congestion; to facilitate the timely, efficient, and economical movement of commercial vehicles to industrial and commercial destinations; and to improve the movement of daily commuter vehicles to and from the workplace.

Concurrent with the value pricing study, the Pennsylvania Turnpike Commission (PTC) implemented electronic toll collection (E-ZPass) for travel between the ticket interchanges on its mainline system.

Where: Pennsylvania Turnpike

Study Completed: The final report summary can be accessed from the FHWA Web site at: [Pennsylvania Turnpike Value Pricing Study](#). Despite the prediction of favorable results the turnpike decided not to adopt variable tolls.

For More Information Contact: Robert J. Smith, Director of Finance, PA Turnpike, Phone: (717) 939-9551, extension 2432, E-mail: rsmith@paturnpike.com; or George L. Hannon, Special Assistant, PA Turnpike, Phone: (717) 939-9551, extension 5124, E-mail: ghannon@paturnpike.com.

TEXAS: Truck Traffic Diversion Using Variable Tolls in Austin

What: This project will examine the use of value pricing to encourage truck traffic to divert from I-35 to a newly constructed, parallel toll facility (SH 130) using variable tolls on SH 130.. Additionally, the project will examine methods to encourage route and time-of-travel shifting.

TxDOT has contacted the American Trucking Associations and has developed a plan to involve the trucking community in the study. Additionally, the study will produce market research related to truck tolling from both international and U.S. trucking interests.

Where: I-35 in Austin, TX. When completed in 2007, Phase 1 of SH 130 will stretch from just north of Georgetown, Texas to US 183 near the Austin-Bergstrom International Airport. This 49-mile tolled highway will be a four-lane divided facility with major interchanges at I-35, US 79, SH 45 North, US 290 and SH 71. Subsequent phases of the project will connect the road to I-10 north of San Antonio.

For More Information Contact: David Powell, Texas Department of Transportation; E-mail: dpowell@dot.state.tx.us. Mark Burris, Ph.D., Texas Transportation Institute; Phone: (979) 845-9875; E-mail: MBurris@tamu.edu. Tina S. Collier, Texas Transportation Institute; Phone: (512) 467-0946; E-mail: t-collier@tamu.edu.

USAGE-BASED VEHICLE CHARGES

Usage-based vehicle charges include mileage-based charges for insurance, taxes, or leasing fees; and car sharing; Pay-As-You-Drive (PAYD) Automotive Insurance is a usage-based charge that converts automotive insurance from a fixed to a per mile cost, providing a financial incentive to drive less.

CALIFORNIA: Car Sharing in the City of San Francisco

What: City CarShare is the nation's only non-profit, fully automated car-sharing program. Its vehicles are located throughout the City of San Francisco, and coverage is expanding rapidly throughout the Bay Area. Project involves automated hourly neighborhood car rentals that substitute for car ownership. Under the Value Pricing Pilot Program, an evaluation of the impacts of car sharing on driving and congestion is underway in San Francisco.

Where: San Francisco Bay Area, California

Study Completed: Existing reports prepared by Prof. Robert Cervero are available on FHWA's Web site at: [USAGE-BASED VEHICLE CHARGES - CALIFORNIA: Car Sharing in the City of San Francisco](#) and select the project name. Final report by Dr. Cervero is expected soon.

Findings: Surveys of members and a comparable group of non-members (located in similar neighborhoods, but without convenient car sharing) suggest a decrease in driving from

members, reduction in gasoline consumption and emissions, and sizable dollar and travel time savings, suggesting that cars were used to replace some of the least convenient off-peak transit trips. Future surveys will seek to identify how vehicle ownership and residential location choices, when combined with the availability of car sharing, affect travel patterns.

For More Information Contact: Rick Hutchinson, Executive Director; Phone: (415) 995-8588; E-mail: rick@citycarshare.org; www.citycarshare.org.

FLORIDA: Dynamically Priced Carsharing in Tampa

What: This project will test "congestion pricing" for carsharing vehicle usage, with differential pricing based upon both time-of-day/day of week and vehicle demand. Such pricing will be coupled with ridesharing promotions and incentives at the university, providing users more options besides driving a carsharing vehicle alone (e.g., finding a ride from someone who owns their own vehicle, sharing a carsharing vehicle, etc.) when congestion pricing for carsharing begins.

Where: Tampa, Florida area

Project Update: Contracts between FHWA, FDOT District 7 and the University of South Florida were finalized at the end of this quarter. The research team is developing methodology for the dynamic pricing structure and testing procedures for TRAC-IT.

For More Information Contact: Julie Bond, CUTR; Phone: (813) 974-9799; E-mail: bond@cutr.usf.edu.

GEORGIA: Simulation of Pricing on Atlanta's Interstate System

What: This test will assess the effects of converting fixed automotive insurance costs into variable driving costs. The research is monitoring one full year of baseline travel activity for approximately 285 participating households.

In Phase II of the study, the impact of mileage-based insurance incentives will be examined. In Phase III, a simulated freeway congestion pricing scheme will be examined.

Where: Atlanta, Georgia area

Method: Approximately 500 vehicles in these households are equipped with instrumentation that monitors the second-by-second vehicle speed and position for every trip. Travel diaries and employer commute options surveys were also collected from each participating household and employer (as well as from a control group).

The research team will monitor the changes in driving patterns and will use statistical analyses of household characteristics, vehicle travel, and relevant employer survey data (parking costs, transit accessibility, etc.) to examine the relationships between the incentives offered and subsequent travel behavior changes. Phases II and III will provide extensive data for the first time on how commuters respond to various types of pricing policies. This will allow evaluation of the impacts of pricing policies on travel behavior, and will provide data from real-world experience to improve the ability of regional travel demand models to estimate the impacts of various types of pricing alternatives.

Project Update: Software problems caused some delay. Pricing should begin in March/April. Online electronic travel diaries are ready to implement and preliminary scheduling of post-study focus groups has been handled.

For More Information Contact: Randall Guensler, Georgia Institute of Technology; Phone: (404) 894-0405; E-mail: randall.guensler@ce.gatech.edu.

***MINNESOTA: Variabilization of Fixed Auto Costs**

What: The Minnesota Department of Transportation and its consultant team led by Cambridge Systematics have completed a demonstration of how drivers change their travel behavior when some of the fixed costs of owning and operating a vehicle are converted to variable costs. The pilot project simulated conversion of vehicle lease and/or insurance pricing from traditional fixed payments to payments based on actual miles driven. This demonstration may help lease companies consider structuring incentives to reduce miles driven over the life of the lease, thus improving the resale value of vehicles, and may help insurance companies better understand the mileage-based insurance market.

Where: Minnesota

Study Completed: The study was completed in November 2005 and final analysis. In March of 2006, the consultant team submitted its recommendations. Project results will be posted on the research web site at the Minnesota Department of Transportation.

Final Products: The project advisory committee accepted the final reports. Part I is titled "Pay-As-You-Drive Experiment Finding" and Part II is titled "Potential Public Policy Implications of Pay-As-You-Drive Leasing and Insurance Products." In late March 2006, the results from the demonstration were reported to the Transportation Research Forum at New York University.

The complete final reports can be found on the web at:

- <http://www.lrrb.org/PDF/200639A.pdf> (PDF, 1.6MB)
- <http://www.lrrb.org/PDF/200639B.pdf> (PDF, 509KB)
- <http://www.lrrb.org/PDF/200639C.pdf> (PDF, 228KB)

The reports are separated into experiment findings, market research, and policy implications

For More Information Contact: Kenneth R. Buckeye, Mn/DOT, Phone: (651) 296-1606, Fax: (651) 215-0443, E-mail: kenneth.buckeye@dot.state.mn.us; Jeffrey Buxbaum, Cambridge Systematics, Inc., Phone: (617) 354-0167, E-mail: jbuxbaum@camsys.com.

***MINNESOTA: Mileage-Based User Fee Regional Outreach Statewide**

What: This project is an effort to provide important input and enhance the national projects examining replacement for the motor fuel tax. This project proposes to do an assessment of public understanding of mileage-based road user charges through market research, outreach and education. Subsequently, this project will provide direct input into ongoing work looking at the motor fuel tax replacement and how the need for a new or replacement tax might be communicated.

Where: Minnesota

Project Update: Experts concluded that a mileage based user fee is a solution that will likely not be feasible for at least 10 years. If or when it is tested or implemented, it is imperative to clearly identify the objectives of the fee as a first step for determining structure/design of the concept and how to communicate to consumers. The adequacy of funding is a political issue

* Projects funded by the FHWA Value Pricing Pilot Program

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and dependent on politicians' willingness to increase the fuel tax. Experts proposed that the strategy be used to supplement, rather than replace, the current motor fuel tax.

Focus groups revealed that the majority of the Minnesota public doesn't fully grasp the amount of tax dollars they spend per year on the transportation system, nor do they easily recognize the sources through which these monies come.

Drivers may be more accepting of a change in the funding method, whether simply an increase in the existing tax or a switch to a mileage-based user fee, if the reason for the change is clearly explained. They saw the general idea of a mileage-based user fee as a fair and reasonable way to tax, just as taxes for electricity and water. Mixed feelings existed, however, as to the need for more money for transportation in general, with a small portion convinced that funds were adequate but mismanaged. While varying the fee based on size and weight of the vehicle was seen as logical, some thought it would unfairly penalize those who have chosen to drive fuel efficient or hybrid vehicles. The congestion pricing model was seen as less fair as it negatively impacts those drivers who need to travel for work during standard "rush hours". There is an attitude that raising the motor fuel tax is the best/long term solution for transportation partially due the added costs of administration. The project team is now developing the subsequent phases of this work which will drill down into consumer attitudes through a qualitative research process to be followed with a customer survey.

For More Information Contact: Kenneth R. Buckeye, Program Manager Value Pricing;
Phone: (651) 366-3737; E-mail: kenneth.buckeye@dot.state.mn.us.

****OREGON: Mileage-Based Road User Fee Evaluation***

What: The Road User Fee Task Force (RUFTF) has examined various revenue raising alternatives for replacing the fuels tax as the primary source of revenues for Oregon's roads. The Legislature asked the task force to evaluate the potential of alternate strategies to replace the fuels tax, focusing in particular on technical strategies for implementing a mileage-based charge and congestion pricing.

Where: Portland, Oregon

Method: The pilot test is designed to demonstrate the technical and administrative feasibility of implementing an electronic collection system for mileage-based user fees and congestion tolls. The on-board technology was demonstrated in May of 2004. Twenty trial vehicles were equipped with the on-board devices in the Fall of 2005. In the spring 2006, after verifying successful functionality, 260 trial participants in Portland, Oregon, had the on-board equipment added to their vehicles. For a period of one year, participants are paying distance charges rather than the fuels tax (when they fill up at the station, the fuels tax will be deducted from the bill and the mileage charge will be added).

Project Completed: The Oregon Department of Transportation released the final report for the Road User Fee Pilot Program on November 20, 2007. The report can be obtained at [Oregon's Mileage Fee Concept and Road User Fee Pilot Program](#).

For More Information Contact: Mr. James M. Whitty; Phone: (503) 986-4284; E-Mail: jim.whitty@odot.state.us or Betsy Imholt; Phone: (503) 986-4077; E-Mail: betsy.imholt@odot.state.or.us.

***WASHINGTON: Global Positioning System (GPS) Based Pricing in the Puget Sound Region**

What: GPS based pricing.

Where: Puget Sound region, Washington

Method: Meters were placed in the vehicles of voluntary participants. Different prices per mile were imposed depending upon the location and time of travel. Drivers were made aware of the pricing both through maps and other printed material, as well as a real-time read-out on the in-vehicle meter. At the start of the pilot, participants received a billing account with a positive cash balance. Any cumulative in-vehicle meter charges were debited against this balance. Any funds remaining in the account at the end of the pilot were kept by the participants. This "hold-harmless" study design gave participants the opportunity to participate without committing their own funds, yet also gave them the incentive to adjust their driving behavior so as to enjoy the surplus remaining in the account at the end of the experiment.

Project Completed: The Puget Sound Regional Council released the final report in April 2008. The report can be obtained at [Traffic Choices Study](#). There was also a recent Seattle Times article on the project that can be obtained at http://seattletimes.nwsources.com/html/localnews/2004369904_tolls24m.html

For More Information Contact: Matthew Kitchen, Puget Sound Regional Council; 1011 Western Avenue, Suite 500, Seattle, Washington 98104-1035; Phone: (206) 464-6196; E-mail: mkitchen@psrc.org.

***WASHINGTON: Pay-As-You-Drive (PAYD) Insurance in Seattle**

What: This study tests the Pay-as-you-drive (PAYD) insurance potential. The company will also recruit new participants to the PAYD pilot. Using the larger data base, they will identify the potential markets for mileage based insurance and, if feasible, implement the product at an earlier stage than originally planned. The PAYD pilot will also develop estimates of emissions reductions.

Where: King County, Washington

Method: This pilot will install the field-tested Intelligent Mechatronic Systems' iPAID global positioning system (GPS) mileage recording devices on a sample of approximately 5,000 vehicles, collect baseline data needed to model the options for a PAYD premium structure, select the best premium structure, and roll out and test it in the State of Washington. The study has both a pre-implementation and implementation phase.

Insurance company research partner, Unigard Insurance Group, will utilize both vehicle history data that provides odometer information and iPAID technology to verify odometer readings and examine driving behaviors from a data base of current insurance holders. Participants will receive discounts for participating in the PAYD pilot. The PAYD pilot will also examine pricing and billing models.

Anticipated Completion Date: 2010

* Projects funded by the FHWA Value Pricing Pilot Program

For More Information Contact: Bob Flor, King County; Phone: (206) 684-1611; E-mail: bob.flor@metrokc.gov.

"CASH-OUT" STRATEGIES/PARKING PRICING

Parking Cash Out is a strategy that involves employers offering their employees the option of receiving taxable cash in lieu of free or subsidized parking provided by the employer. Employees may deny the cash and keep the tax-free parking subsidy or accept tax-free transit or vanpooling benefits in its place-with any balance in taxable cash. Car cash-out involves paying households to use one less car for a certain period of time. It helps people review their transportation choices and see how travel by foot, bicycle, transit, and ridesharing is competitive with the private automobile. The goal is to show people that they can save money and simplify their lives by not owning a second - or even first - car.

CALIFORNIA: Car Share Innovations in the City of San Francisco

What: This project includes two distinct program elements:

- 1) "Unbundling Housing from Parking," where car-sharing vehicles will be placed in new housing developments allowing such developments to provide less parking and include more housing units, thus reducing housing costs; and
- 2) a pre-implementation "Integrated Car Sharing/Car Pooling System," where technologies will be explored to facilitate ridesharing among car-sharing participants, enabling them to reduce costs by sharing rides while car-sharing.

Where: San Francisco, California

Anticipated Completion Date: 2010

Project Update: The City Carshare Team hired a contractor to assist with research and developing the 'best practices guide'. In addition, the Team has been working with several developers who will offer unbundled parking so they can place vehicles and determine how to monitor data on usage. Finally, City Carshare is also talking with an affordable housing group to see how they can include these types of developments in our efforts.

For More Information Contact: Rick Hutchinson, City Carshare; Phone: (415) 995-8588 Extension 314; E-Mail: rick@citycarshare.org.

CALIFORNIA: Smart Parking Initiative in San Diego

What: This new project will build on the priced smart parking system tested at the Bay Area Rapid Transit (BART) system's Rockridge station. The team will test various parking management strategies, including real-time advanced traveler information about parking availability at stations throughout the system with integrated reservations capabilities, variable pricing based upon time of day and demand, and a unique credit-based pricing system (or transit fare discounts) that will reward station access by transit and carpool.

Where: San Diego area

Method: Park-and-ride carpoolers will, in addition to sharing parking expenses among themselves and receiving additional financial rewards, be able to reserve priority parking spaces nearest the station platforms. Pricing will be used to achieve a targeted parking usage rate (e.g., 95% of capacity) at each station and to encourage station access by carpool and transit modes.

Anticipated Completion Date: 2010

Project Update: The consultant team completed the installation of the parking system technologies and initial research observational assessment. Team will establish an existing conditions related report and will also serve as the platform for developing several parking management strategies composed of several operational suites, including: preferred parking for vanpool/carpool transit riders, limited/long-term operations, and pre-reservations and paid parking strategies.

For More Information Contact: Alex Estrella, San Diego Association of Governments;
Phone: (619) 699-1928; E-Mail: aes@sandag.org.

MINNESOTA: Parking Pricing Demonstration in the Twin Cities Area

What: The City of Minneapolis is currently undertaking a major downtown transportation study where parking will be an important consideration. The 18-month outreach program will include efforts tailored specifically to the media, local governments, and community leaders and will create a high level parking pricing task force. Demonstration sites will be selected and parking pricing will be implemented at these sites. A comprehensive evaluation will be performed.

Where: Minneapolis and St. Paul, Minnesota

Method: A variety of pricing innovations will be explored, as will integration with the I-394 MnPASS project and the University of Minnesota Metro Transit smart-card system.

Project Update: Background research was begun to examine the current state of parking in select locations in the Twin Cities. The team is identifying specific parking pricing demonstration projects including local government partners.

For More Information Contact: Kenneth R. Buckeye, Program Manager Value Pricing;
Phone: (651) 366-3737; E-mail: kenneth.buckeye@dot.state.mn.us.

****WASHINGTON: Parking Cash-Out and Pricing in King County***

What: project was designed to implement parking cash out and other parking management strategies in downtown high-rises in cooperation with building owners and employers. The purpose was to provide building owners or managers with incentives to shift existing parking supply to carpool, vanpool, or short-term parking; and to reduce the supply and increase the cost of single-occupant monthly vehicle parking. Unfortunately, a serious downturn in the Seattle economy stalled implementation.

Where: Downtown Seattle, Washington

Study Completed 2004: The final report can be accessed on the FHWA Highway Community Exchange Web site at: [CASH OUT" STRATEGIES - WASHINGTON: Parking Cash Out](#). There is currently a cash-out program marketed to employers in place in King County.

For More Information Contact: Kathy Koss, King County Metro; Phone: (206) 684-1649, Fax: (206) 684-2058, E-mail: Kathy.Koss@metrokc.gov; 400 Yesler Way, M.S. YES-TR-0600, Seattle, Washington 98104.

* Projects funded by the FHWA Value Pricing Pilot Program

***WASHINGTON: Cash-Out of Cars in King County**

What: The *Way to Go, Seattle!* "One-Less-Car Demonstration Study" asked households to use one less car and keep daily records of how they got around.

Where: Seattle, Washington

Method: Households were provided with information on how much their car actually costs to own and operate, as well as information on how to get around by biking, riding transit, and walking. Participant households were provided with a weekly study stipend during the times they were not supposed to use their cars to simulate the financial savings they would realize if they were to actually sell one of their cars (the national average cost of owning/operating a second car is \$85 per week). Daily records, odometer readings, and anecdotal stories were analyzed to document costs and to understand whether or not households made significant behavior changes such as consolidating trips, carpooling, taking transit, biking, or walking.

Web Site: A web site describing the program as it is currently available to residents exists at: <http://www.seattle.gov/waytogo/onelesscar.htm>. The final report and replicability package for the demonstration project are also available at: <http://www.seattle.gov/waytogo/waytogo.htm>.

Study Completed: The Final Report with stand-alone Executive Summary and Replicability Package is complete. Fifty CD-ROM copies of the Replicability Package disc were made and arrangements were also made to post all of the documents on the project web page (www.seattle.gov/waytogo).

A pilot version of the "One Less Car Challenge" was launched in September 2003. The Challenge was based on the results of the Demonstration Study that showed that many types of households from all over Seattle were able to reduce drive-alone car trips, and the accompanying mileage and emissions, when given information about 1) the availability of multi-modal transportation choices and 2) the actual costs of owning and operating their second (and in some cases their primary) car.

Project Results: The eighty-six participant households reduced total miles driven by 41,463, or an average of 1,974 miles not driven per week. Likewise, participants collectively saved a total of 8,003 fewer car trips, or an average of 381 fewer trips per week. Finally, the eighty-six households reduced total CO₂ emissions by 30,198 pounds, or an average of 1,438 pounds per week. Additionally, 20 percent sold their "extra" car after participating in the study or during the selection process

For More Information Contact: Ms. Jemae Hoffman, Mobility Manager for the Policy, Planning, and Major Projects Division of Seattle Department of Transportation; Phone: (206) 684-8674; Fax: (206) 684-5180; E-mail: jemae.hoffman@seattle.gov or visit www.seattle.gov/waytogo.

REGIONAL PRICING INITIATIVES

Road pricing strategies that include comprehensive area, or region-wide applications that evaluate pricing's effect on reducing congestion, altering travel behavior, and encouraging the use of other transportation modes. Region-wide pricing applications that use technologies that provide drivers with real-time congestion and pricing information on alternative routes are especially encouraged.

CALIFORNIA: Investigation of Pricing Strategies in Santa Clara Valley

What: The study will provide an assessment of: (1) institutional, design and operational issues related to replacing general purpose freeway mainline and auxiliary lanes with priced managed lanes, and (2) benefits and costs associated with such replacements. It will also assess the benefits and costs of creating a system that integrates priced, managed lanes, freeway operations, and new transit services. Additionally, it will investigate the implementation of a credit-based congestion pricing approach involving both managed lanes and transit, and determine near-term implementation feasibility. The study will contribute to the development of a comprehensive multi-modal value pricing program that includes alternative transportation options.

Where: Santa Clara Valley, Northern California

Anticipated Completion Date: 2010

Project Update: Valley Transportation Authority staff is in the process of preparing the work scope, project schedule and budget to commence work.

For More Information Contact: Casey Emoto, Senior Transportation Engineer; Phone: (408) 321-5564; E-mail: casey.emoto@vta.org.

FLORIDA: Sharing of Technology on Pricing

What: The Federal Highway Administration, the Organization for Economic Cooperation and Development (OECD), the Transportation Research Board (TRB), and the Florida Department of Transportation collaborated in sponsoring an international symposium to set the stage for consideration of wider implementation of innovative pricing strategies to meet congestion relief, emission reduction, and fiscal objectives. The symposium assembled key pricing experts from across the U.S. and overseas and provided a unique opportunity to synthesize the lessons learned about pricing policies throughout the world. It generated a greater understanding of economic, institutional, and administrative issues and concerns relating to pricing strategies, and is expected to provide invaluable impetus for broader consideration of value pricing strategies throughout the U.S.

It explored U.S. and international applications of road pricing strategies in different governmental and socio-economic settings. Case studies from the United States, Europe, and Asia were the principal focus of the symposium. An international group of participants discussed the rationale and motivations for implementing pricing; factors affecting the political and public acceptance of pricing strategies; the use of pricing revenues; and project outcomes. Drawing on papers, presentations, and symposium discussions, the TRB Steering committee evaluated the current state of practice, assessed future directions and opportunities, and identified research and information needs.

Where: Key Biscayne, Florida – November 19-22, 2003

Study Complete: The symposium was held in Key Biscayne, Florida on November 19-22, 2003.

The final report can be accessed on FHWA's Highway Community Exchange Web site at: [INTERNATIONAL SYMPOSIUM ON ROAD PRICING: Conference Proceedings](#).

ILLINOIS: Comprehensive Pricing in Northeast Illinois

What: The project will evaluate the feasibility of reducing bottlenecks through a system of priced queue jumps and will assess resulting changes in travel times and delays on the region's expressways. The study will also assess the feasibility of better utilizing electronic toll collection and variable pricing mechanisms to reduce traffic congestion and access the potential of implementing pricing to increase the use of alternate travel modes and enhance the capacity on the region's expressway system.

Where: Illinois State

Anticipated Completion Date: 2010

For More Information Contact: Mary Wells, Illinois State Toll Highway Authority; Phone: (630) 241-6800 Extension 3902; E-mail: mwells@getipass.com.

MARYLAND: Feasibility of Value Pricing

What: The feasibility study will evaluate implementing HOT lanes on I-270 from I-495 (Capital Beltway) to I-70 (Frederick County).

Where: on I-270 from I-495 (Capital Beltway) to I-70 (Frederick County).

Anticipated Completion Date: 2007

Project Update: In 2008, the feasibility study continued assessing managed lanes on I-270 from the I-270/I-370 interchange in Gaithersburg to I-495 (Capital Beltway), and along I-495 to just north of the Dulles Toll Road in Virginia. The study limits connect the Intercounty Connector, a planned toll-lane facility between I-95 and I-270, with Virginia's I-495 HOT Lanes project.

For More Information Contact: Michael J. Haley, Chief of Regional & Intermodal Planning, Maryland State Highway Administration; Phone: (410) 545-5675 or 1-888-204-4828; E-mail: mhaley@sha.state.md.us.

MINNESOTA: FAST Miles in the Twin Cities

What: This led to the implementation of I-394 MnPASS HOT lanes in May 2005.

Where: Minneapolis and St. Paul, Minnesota

Method: This project explores the political feasibility of an innovative pricing concept called "FAST Miles". Under the FAST Miles concept, each motorist is provided a number of dollar credits per month, analogous to the "free minutes" given by cell phone providers. The motorist, at his or her discretion, can apply those credits to use priced lanes. Once credits are exhausted, the motorist is charged the going rate to use the priced lanes, analogous to the process when a cell phone user consumes more than his or her allocated "free" minutes.

FAST Miles is designed to promote carpooling by allowing motorists to "pool" their credits. Should a commuter turn to public transportation, unused credits can be rebated through reduced vehicle registration fees or property taxes. In both cases, occupants of multiple occupancy vehicles are rewarded by improved access to free flowing traffic and lower use costs. The project will explore the feasibility of an innovative pricing concept to ease highway

congestion on limited access facilities by promoting the use of car pools and public transportation.

For More Information Contact: Kenneth R. Buckeye, Program Manager Value Pricing;
Phone: (651) 366-3737, E-mail: kenneth.buckeye@dot.state.mn.us.

***MINNESOTA: Project Development Outreach and Education**

What: The objective of this project is to develop local champions and educate the citizens of Minnesota to help bring about value pricing implementation projects in Minnesota. A visible group of local leaders will advocate value pricing in Minnesota and succeed in convincing doubters that pricing should be tested and implemented.

Where: Minnesota

Method: The University of Minnesota Humphrey Institute's project team will work with Mn/DOT Metro Division staff, Metropolitan Council transportation staff, and members of the Value Pricing Advisory Task Force to develop support for value pricing alternatives and specific projects. Specific activities will include examining the technical and political feasibility of alternative approaches, giving presentations to elected officials, transportation advocacy and other interest groups, and the formation of a local advocacy group for value pricing

Study Completed: The final report is available at [Minnesota Value Pricing Outreach and Education](#) (PDF, 17MB). The Humphrey Institute is now working with Mn/DOT and the Metropolitan Council on the next phase of value pricing outreach and education. This next phase focuses on how to integrate transit improvements into the current I-394 MnPASS project as well as Phase II of the I-394 project and future MnPASS corridors.

The Humphrey Institute continues to manage the Congestion Pricing (CON-PRIC) and Project Partners list serv, maintain the www.valuepricing.org web site, and conduct national outreach and education activities on pricing through TRB annual and mid-summer meetings.

For More Information Contact: Lee Munnich, Sr. Fellow and Director, State and Local Policy; Phone: (612) 625-7357; Fax: (612) 626-9833; E-mail: Lmunnich@umn.edu.

***TEXAS: Regional Value Pricing Feasibility Study in Dallas**

What: The 2005 Regional Value Pricing Corridor Evaluation and Feasibility Study is now complete. This study discusses the historical and current experiences of value pricing applications around the world. A guide as to how the Dallas-Fort Worth Region plans on evaluating candidate facilities for both short-term and long-term applications is detailed. The criteria developed were then applied to determine the selection of a demonstration project in the Dallas-Fort Worth Region. I-30/The Tom Landry Freeway between the Dallas CBD and Arlington, Texas to the west was selected as the demonstration project.

Where: Dallas – Fort Worth Region

Study Completed: The public can view and download this study from NCTCOG's Web site at [2005 Regional Value Pricing Corridor Evaluation and Feasibility Study](#).

For More Information Contact: Tim Young, North Central Texas Council of Governments;
Phone: (817) 695-9288; E-mail: tyoung@nctcog.org.

* Projects funded by the FHWA Value Pricing Pilot Program

TEXAS: HOT Lane Network Evaluation in Houston

What: This project will examine Houston's six HOV lane facilities with a goal of developing a detailed implementation plan for a HOT lane network. This will include a plan to expand current HOT activities on the Katy and Northwest Freeways and add tolling to the other four HOV lanes to develop an integrated network of HOT lanes.

Where: Houston, Texas area

Anticipated Completion: August 2008

Project Update: Construction continues and toll operations are slated to begin in the late Summer or early Fall of 2008.

For More Information Contact: David E. Fink, Texas Department of Transportation, 6922 Old Katy Road, Houston, Texas 77024; Phone: (713) 881-3063, E-mail: dfink1@houstontranstar.org or Mark Burris, Texas Transportation Institute, Phone: (979) 845-9875, E-mail: mburris@tamu.edu.

***VIRGINIA: Regional Network of Value Priced Lanes**

What: The National Capital Region Transportation Planning Board (TPB) is initiating a study evaluating a regional network of value priced lanes.

Where: Currently, the plan includes four new high-occupancy toll (HOT) lanes along 15 miles of the Capital Beltway in Virginia, and six new variably priced lanes along 18 miles on the Inter-County Connector in Maryland. It also includes a study of the conversion of existing HOV lanes into HOT lanes along 47 miles of the I-95/395 corridor in Virginia.

Anticipated Completion Date: September 2008

Project Update: The project team completed the study analysis and final report. The report was presented to the TPB's Task Force on Value Pricing in February and to the TPB in March. The final report, titled *Evaluating Alternative Scenarios for a Network of Variably Priced Highway Lanes in the Metropolitan Washington Region*, can be obtained by clicking on the following link: [Evaluating Alternative Scenarios for a Network of Variably Priced Highway Lanes in the Metropolitan Washington Region](#)

For more information contact: Michael Eichler, National Capital Region Transportation Planning Board; Phone: (202) 962-3763, E-mail: meichler@mwkog.com.

VIRGINIA: Value Pricing for the Hampton Roads Region

What: This study will focus a significant amount of effort in educating the public about pricing. The goal of the study is to ultimately lead to recommendations for potential implementation of value pricing concepts across the Northern Virginia metropolitan area and the Hampton Roads region. One of the goals is to assess how public perceptions and the potential level of support before and after conducting outreach and education related to potential tolling strategies.

* Projects funded by the FHWA Value Pricing Pilot Program

Where: Hampton Roads Region, Virginia

Anticipated Completion Date: 2007

Project Completed: VDOT is preparing the final report. For public outreach tools you can go to the following websites [Downtown Tunnel/Midtown Tunnel/MLK Extension](#) .

The http://www.virginiadot.org/info/congestion_pricing.asp webpage which contains all of the public outreach materials; a press kit; 2 different types of brochures for public distribution; a PowerPoint template for making presentations; a tri-fold display booth; and 2 banner-up displays.

For more information contact: Marsha Fiol, Virginia Department of Transportation; Phone: (804) 786-2985; E-mail: Marsha.Fiol@VDOT.Virginia.gov.

WASHINGTON: Tolling Strategies in the Seattle Area

What: WSDOT received 2006 funding to advance public awareness and acceptance of value pricing and associated operational toll concepts from a "user's perspective," incorporate previous study findings into near and mid term policies and project planning, and improve state and regional coordination. The project will communicate to the public and elected officials the concept of value pricing and how tolling can help manage traffic. The inability of public agencies to effectively communicate these concepts has hindered and delayed acceptance of pricing concepts.

Where: Seattle, Washington

Anticipated Completion Date: September 2009

Project Update: WSDOT and PSRC staff are working to develop of a survey to be fielded in the second quarter of 2008.

The pricing outreach work briefly described above is being coordinated with other pricing activities including conversion of the SR 167 HOV lanes to HOT. WSDOT's pricing work is also being coordinated with the update of Destination 2030, the region's Metropolitan Transportation Plan, currently being prepared by PSRC. That plan will include analysis of several roadway pricing alternatives.

For More Information Contact: Charles Prestrud, Urban Planning Office, Washington State DOT; Phone: (206) 464-1271; E-mail: PrestrC@wsdot.wa.gov.

TRUCK ONLY TOLL FACILITIES

Truck only toll (TOT) lanes are highway lanes that are reserved for the use of commercial vehicles, primarily trucks and buses. Commercial vehicles can pay a fee to use the lanes if so desired, or they can continue to use the regular lanes. Further, fees are only charged when necessary to manage the performance of the lanes. TOT lanes can either be newly constructed facilities, or they can be created by reallocating the use of existing lanes. Similar in concept to HOT lanes, the pricing strategy for TOT lanes corresponds to a cost per mile that will keep the TOT lanes performing at a level of service that provides more reliable travel.

CALIFORNIA: Analysis of Environmental Effects of PierPASS and Dedicated Truck Lanes in Southern California

What: This project will build off of existing analysis on the congestion reducing benefits of PierPASS by conducting a separate environmental analysis of the program. PierPASS provides off-peak truck discounts from the normal charges for accessing the Ports of Los Angeles and Long Beach.

Where: Ports of Los Angeles and Long Beach, California

Method: This project will look specifically at fleet composition and trucking movements, gather new data, and apply it to advanced emissions models in order to assess environmental effects. Study results will provide a comprehensive understanding of the environmental benefits of this project.

Anticipated Completion Date: 2010

Project Update: The project was awarded funds in April 2007.

For More Information Contact: Matthew Barth, Center for Environmental Research and Technology; Phone: (951) 781-5782; E-mail: barth@ee.ucr.edu.

GEORGIA: Northwest Truck Tollway

What: The study will examine a truck-only toll facility extending on Georgia State and interstate highways near Savannah, GA. The study will initiate a peer-to-peer exchange; conduct market research on the potential for truck-only toll facilities; develop additional data on truck travel; refine the travel model related to truck travel; examine options for selling additional capacity to other modes (single occupant vehicle, high occupant vehicle, transit, etc.); examine use of revenues and other activities.

Where: Georgia State Route 21 near I-95 to I-16 at the intersection of I-516 (Savannah, GA).

Anticipated Completion Date: 2008

Project Update: An initial set of model runs and toll runs at various toll levels under different alignments has been completed. The toll structure has also been decided and will be tested for the development of a template for the model runs for each of the alternatives. The final alignments for the corridor for the portions that extend north to I-95 and I-516 have been determined. These alignments will assist in design cost estimates. Public involvement activities have been initiated to reflect the revised scope, which are to include a stakeholder roundtable and the conception of a strategy to market toll roads in the Savannah newspaper. The peer-to-peer exchange occurred in February and included meetings with SCAG, LAMTA, the Port of Long Beach/Los Angeles, PierPASS, and SR91 staff.

For More Information Contact: Patrick Vu, Senior Transportation Consultant, State Road Tollway Authority; Phone: (404) 893-6130; E-mail: patrickvu@georgiatolls.com.

Value Pricing Projects - International³

AUSTRIA: NATIONAL VARIABLE TOLLING MOTORWAY NETWORK

What: Time based system for all vehicles under 12 tons, distance based system for all vehicles over 12 tons.

Where: Austrian highway system.

Method: Charge is paid via on-board units (OBUs) called *Go-Box*. More than 800 tolling gantries have been installed on the network. Enforcement system employs license plate reader by automatic character recognition and when appropriate, sends signals to the enforcement officer.

Start Date: 1997 – a time-based charge system a “Vignette system”,
2004 – electronic distance based toll on vehicles over 12 tons,

Web site: Austrian Road Administration (<http://www.bmvit.gv.at/en/index.html>)

AUSTRALIA, MELBOURNE: MELBOURNE CITYLINK

What: A 22 km privately operated tollway linking major routes between Melbourne Airport to the port and industrial centers in the southeast. Tolls vary by vehicle class: cars, light trucks, and heavy freight. Night discounts for trucks and weekend pass discount for cars and trucks are offered. Toll road is undergoing an upgrade that should open in 2009.

Where: Melbourne, Australia

Method: transponders, account. The advanced freeway management system will include:

- ramp metering;
- reversible flow lanes during peak periods; and
- lane control to manage lane availability, traffic speed and driver information;

Web page: <http://www.citylink.com.au/>; www.vicroads.vic.gov.au; www.transurban.com.au

AUSTRALIA, SOUTH AUSTRALIA: ADELAIDE CRAFTERS HIGHWAY

What: The 10 km highway was one of South Australia's largest road projects and includes two 500m long Heysen tunnels.

Where: South Australia, Australia. Links Adelaide to Crafters in the Adelaide Hills and then continues from Crafters as the South Eastern Freeway.

Method: This project also included implementing an Advanced Traffic Management System (ATMS) in connection with their existing Traffic Management System. The system monitors the Variable Speed Limit Signs (VSLS), Variable Message Signs (VMS), Changeable Message Signs (CMS) and video coverage along the length of the new section of the highway.

The traffic management and surveillance system includes cameras, infrared tall vehicle detectors and signs, lane use signals and tunnel control systems.

³ Sources listed on page 10

The Changeable message signs installed at every 200m along the highway in 2005 can display three different messages (Green for normal traffic conditions – with distance to towns and turnoffs; yellow or red if hazard ahead; and red for warnings with appropriate driver information. CMS allow for active traffic management with the ability to change the speed limit of the road from Transport SA headquarters in Adelaide

Completion Date: March 2000

CANADA, ONTARIO: 407 EXPRESS TOLL ROUTE (ETR)

What: The 407 Express Toll Route (ETR), one of the first open access all electronic toll highways, opened its first sections in October 1997. To accommodate future traffic needs, 407 ETR has the capability of expanding from six to ten lanes

Where: Ontario, Canada – The 407 ETR runs east-west just north of Toronto (Canada's largest city), from Brock Road in Pickering in the east to the QEW / 403 interchange in Hamilton in the west.

Method: Electronic toll and automatic vehicle identification system, vehicle detector and classifier

Fees: Charges vary depending on the time of day (peak hours/weekday); vehicle class; and distance traveled. Discounts are given if vehicle has a transponder type device.

Web page: <http://www.407etr.com/>

CHILE, SANTIAGO: A SERIES OF TOLL ROADS AROUND SANTIAGO

What: A network of urban toll roads with varying charges.

Where: Santiago, Chile

Method: Tolls paid by drivers vary depending on the time of day and the number of kilometers traveled. Tolls are increased when speed drops below 50 km per hour.

Public Opinion: Initial resistance to charging ended after the operation began and time savings increased.

CHINA, BEIJING: Real-Time Traffic Information System

What: Installed a robust traffic information and management system to collect, analyze and manage real-time traffic in preparation and use during the 2008 Summer Olympics.

Where: Beijing, China.

Method: The traffic information system is intended to collect, process, analyze, display and store real-time traffic information from systems in and around the city, with the result of controlling and efficiently managing the road infrastructure to increase traffic volumes.

Project Start: 2005

Project Complete: 2008.

ENGLAND, DURHAM: Road user charge scheme

What: This cordon-based pricing system charges drivers to enter a fixed zone.

Where: Durham, England – historic city center, cathedral and castle area.

Method: Access is via a single road. Charge is applied Monday through Saturday from 10:00 am to 4:00 pm. No fee during off hours. Drivers pay while exiting the area at a pay station. Closed-circuit television surveillance.

Results:

- 85 percent reduction in vehicle traffic (2000 to 2000 vehicles per day);
- 10 percent increase in pedestrian activity; and
- increase in bus usage.

Public Opinion: Significant improvement – 70 percent now believe the charge is a good idea (versus 21 percent prior to implementation). 78 percent now believe Durham City is a safe place to visit (versus 68 percent prior to implementation).

Project Start: October 2002

Web page:

www.durham.gov.uk/durhamcc/usp.nsf/web/pages+with+sections/Transport+and+Streets+-+Parking-Durham+Road+User+Charge+Zone

ENGLAND, LONDON: CORDON PRICING

What: Cordon pricing in the central zone of London. Single daily charge to enter the zone.

Where: London, England – central zone

Method: Uses an automatic number plate recognition (ANPR) system; License plates are scanned when entering the central zone. Those without a permit are charged a fee via the mail. Charge is applied to vehicles entering zone Monday through Friday between 7:00 am and 6:30 pm.

Fees: 90 percent discount for zone residents. Revenues generate 100 million pounds (80 percent is spent on improving bus service within London). Projected net revenue for 2007/2008 is about 140 million pounds, reflecting an increase in the charge.

Results:

- traffic entering zone decreased 18 percent,
- congestion in zone decreased 30 percent,
- buses and taxis increased 20 percent,
- bus reliability and travel times improved,
- congestion charging has had neutral impact on central London economy

Project Start: 2003

Web page: London Congestion Charging: www.tfl.gov.uk/roadusers/congestioncharging/

ENGLAND, LONDON: HEATHROW T5 MULTI-STORY CAR PARK

What: The T5 Multi-Story Car Park is an automated parking system is located at Heathrow Airport.

Where: Heathrow Airport's Terminal 5 parking structure.

Method: The automated system employs a plate recognition system and prints the plate number on the ticket. Each driver is directed to an empty parking space. This information is updated in real time. The sensors are all networked to a central system, which checks every few seconds for an update on the parking space status.

Return space location system – when returning to the vehicle, the driver may insert his or her ticket into the locator terminal and a 3D map of the structure will light up the region where the car is parked.

Directing vehicles to open spaces eliminates some circling and GHG emissions.

ENGLAND, LONDON: M6 MOTORWAY TOLL ROAD (M6T)

What: Opened in December of 2003, this privately financed and operated three-lane toll road provides a link around Birmingham. The motorway is 27 miles in length, has eight entry and/or exit junctions, and six toll stations.

Where: Bypass of M6 north of Birmingham to the M42 east of Birmingham.

Method: Variable tolls based on vehicle type, time of day, day of travel and day versus evening travel.

Web page: <http://www.m6toll.co.uk/pricing/>

FRANCE: TOLL MODULATION

What: Extensive toll road network

Where: France

Method: In 1992 instituted a Sunday afternoon toll. Tolls have evolved to today where variable speed tolling is applied. Shifted toll control from national level to a county level in early 2000s. Over 4,500 miles operated by 6 mainly publicly owned companies (ASF, SAPRR, SANEF, ESCOTA, AREA, and SAPN).

Different variable tolls applied: time variable based on time of day; itinerary variable based on route traveled; environmental variable based on vehicle emissions.

Start Date: 1955
1998 – implementation of time variable toll

Web page: <http://www.sanef.com/en/index.jsp>

FRANCE, PARIS: A86 WEST TUNNEL

What: The final link of the 80 km A86 ringroad around Greater Paris. Two toll tunnels – one double-deck tunnel for light vehicles.

Where: Paris, France. Ringroad around Greater Paris, from Malmaison to Versailles.

Method: Advanced Traffic Management System (ATMS), techniques. An information system automatically collects traffic data such as speed and density of traffic. This information is relayed to a safety and control office to allow quick and effective control of vehicles entering, using and exiting the tunnel. The tunnels also feature 350 DIVA cameras for the instantaneous detection of non-moving vehicles to supplement the fire alarms, air quality detectors and other traffic management systems that usually determine incidents and intervention response.

Completion Date: 2010

GERMANY: NATIONAL MOTORWAY CHARGING SCHEME FOR HGVS

What: National motorway charging scheme for heavy goods vehicles (HGVs). System was instituted to address the high volume of trucking on German highways. Thirty-five percent of all truck kilometers on Germany's highways are made by foreign trucks.

Where: Germany highway system.

Method: All trucks weighing over 12 tons pay a charge based on distance traveled, emissions by vehicle class, and number of axles. Charge is paid via on-board units (OBUs), manually, or via internet. Long term method will mostly be OBUs.

Start Date: January 2005

Results: - Six percent shift to rail from road freight.
- One negative impact – some trucks are diverting off the highways onto other roads to avoid paying the charge.

Web sites: - Toll Collect (www.toll-collect.de);
- German Federal Transport Ministry (www.bmvbs.de/en)

GREECE, ATHENS: ATHENS TRAFFIC MANAGEMENT SYSTEM

What: The Athens Traffic Management System (TMS) was planned in 2002 and opened in time for the 2004 Summer Olympics.

Where:

Method: The TMS is controlled from two control centers in case one becomes inoperable. Data come from multiple sources: close circuit television, traffic signals, ground loop detectors, speed radar devices, security personnel, and traffic police. The TMS system uses algorithms to determine the best fix and automatically acts via message signs on the highway by adjusting the traffic signal phasing and alerting the traffic police.

Completion Date: Summer 2004

GREECE, ATHENS: ATTIKI ODOS MOTORWAY

What: A tolled highway that is actually three main highways with an outer ring under construction.

Where: The three separate highways are: Stavros Spata A/P Motorway (52.4 km); Attiki Odos (47 km); and Markopoulo to Eleftherios Venizelos (12.9 km). The outer ring highway is the Aigaleo Ring (8 km).

Method: The Integrated Toll and Traffic Management System (ITTMS) allows for smart cards and electronic toll collection (ETC).

HUNGARY: SPEEDWAY NETWORK

What: Time based system for all vehicles for about 640 km of current highway system.

Where: Hungary highway system.

Method: System charges are based on time dependent access. There are no toll gates or check point. A mileage based tolling system is recommended beginning in 2008 to ensure all users pay according to their actual use of the roads.

Start Date: 1996

ITALY, GENOA: CORDON PRICING

What: Cordon pricing system created to protect a 2.5 square kilometer area of the historical downtown area.

Where: Genoa, Italy – historical downtown area

Method: Cordon pricing. Fees are collected per trip with fares varying according to day of the week, time of day, and environmental conditions. Uses a license plate video recognition system.

Web page: <http://www.progress-project.org/Progress/genoa.html>

ITALY, ROME: HISTORICAL CENTER

What: Since 2001, controlling access to historical center of city by combined Access Control System and Road Pricing Scheme.

Where: Rome, Italy

Method: Gates and cards. Restriction period (6:30 am to 4:00 pm) controlled through access gates and permits (transponders/on-board units and smart cards).

Results: - decrease in overall traffic throughout the day.
- decrease in the morning peak hour (8:30 am to 9:30 am)
- increase in public transit use

Future plans: potential future applications discussed: charging two wheel vehicles, and extending application to evening hours from 4:00 pm to 11:00 pm

JAPAN: NATIONAL TOLLING MOTORWAY NETWORK

What: Tolling covering 8,800 km of total highway system. Tolling replaced vehicle and fuel taxes for financing roads program.

Where: Japan highway system.

Method: Current tolls are distance based, with a double charge for large vehicles. System uses electronic tolling collection with on-board units.

Start Date: 1952

Web site: Japanese Road Bureau, Ministry of Land, Infrastructure and Transport
(www.mlit.go.jp/road/road_e/index_e.html)

KOREA, SEOUL: NAMSAN TUNNELS #1 AND #3

What: Congestion toll pricing in two tunnels

Where: Seoul, Korea

Method: Day toll, nights and Sundays free.

Web page: - *Four-Year-Old Namsan Tunnel Congestion Pricing Scheme in Seoul*
(<http://www.iatss.or.jp/english/research/26-1/pdf/26-1-03.pdf>)

- Seoul Metropolitan Government
(http://english.seoul.go.kr/today/news/traffic/1240291_3327.html)

MALTA, VALLETTA: CONTROLLED VEHICULAR ACCESS (CVA)

What: Cordon pricing or as it is referred to in this city, Controlled Vehicular Access is a city wide charge based on time traveled into the center city area.

Where: Valletta, Malta

Method: Fees are assessed using Automatic Number Plate Reading (ANPR) technology and dedicated camera systems to monitor and photograph vehicles entering and exiting the CVA boundary. A charge is based on time traveled (amount and time of day) in the city.

Start: May 2007

Web page: Controlled Vehicular Access (<http://www.cva.gov.mt/>)

NORWAY, BERGEN: CORDON PRICING

What: Cordon pricing – a toll is placed on vehicle traffic entering the city. This application was initially developed to help pay for infrastructure but evolved into congestion management tool. On average, 30 percent of state's budget for road construction comes from toll revenue. Revenue for public transit and roads is split 50/50.

Where: Bergen, Norway – First city in Europe to introduce cordon pricing system

Method: Toll Ring. Only incoming traffic is charged. Facility is a fully electronic toll collection system, which debits accounts as drivers pass through unmanned toll booths around the cordon.

Fees: Fee is charged Monday through Friday, 6:00 am to 10:00 pm. Buses are exempt.

Results: - 6 to 7 percent decrease in traffic

Started: 1986

Web page: Norwegian Public Roads Administration: www.vegvesen.no

NORWAY, OSLO: TOLL RING

What: Cordon pricing – a toll is placed on vehicle traffic entering the city. This application was initially developed to help pay for infrastructure but evolved into congestion management tool.

Where: Oslo, Norway

Method: Toll Ring. Only incoming traffic is charged. Vehicle transponders with photo identification and charging through mail for non-permitted vehicles. 19 toll booths around the city center.

Fees: Fee is charged at all times of day, seven days a week.

Results:

- raised revenue for infrastructure investment
- slower traffic growth than national average
- two thirds of the population is in favor of a new toll ring where income is dedicated to public transit
- Chamber of Commerce reported no significant impact on trade
- first year of operation's initial investment of 250 million Nkr was covered by revenue of 750 million Nkr.

Started: 1990

Public Support: Initial support was limited. In 1989 before opening of toll ring 70 percent of population in Oslo region was against the charge. By 1996, support increased to 45 percent of the population in favor of the toll ring.

Web page: Norwegian Public Roads Administration: www.vegvesen.no

POLAND, GDAŃSK: A1 GDAŃSK to TORUŃ MOTORWAY

What: Tolloed public-private highway. The motorway will be a dual carriageway with two lanes in each direction and an emergency lane as well as a median barrier. Bridges and overpasses will be constructed as necessary to cross rail lines and rivers. There will be one toll plaza on phase one of the road and toll arrangements on the slip road junctions as well.

Where: Gdańsk, Poland – link between the north and south of Poland from the Baltic ports of Gdańsk and Gdynia across the country to its ultimate end in Austria (Vienna) and then go through Slovenia to meet the Mediterranean and the Adriatic seas.

The Polish section of the A1 will be constructed in two phases. The first section of 90 km is currently underway and runs from Gdańsk to Nowe Marzy in the north of Poland. The Polish

section of the A1 will run for 568 km from Gdańsk through Toruń, Łódź, Częstochowa and Katowice to Gorzyczki on the border. Phase two will be a 60 km section which will extend the southern end of the A1 to Toruń.

Completion Date: Phase One - 2008.

POLAND, GDAŃSK: A2 TOLL MOTORWAY

What: Talled public-private highway. Phase I construction - 150km dual-lane road, 78 new bridges, 31 renovated bridges, 7 interchanges, 3 toll plazas, and 3 maintenance centers.

Where: The A2 motorway (610 km) will run through Warsaw to connect with Germany (German A12 autobahn) in the East and Belarus in the West as a part of the planned East-West Trans European motorway (2,500 km) Berlin to Moscow route (part of the E30).

SCOTLAND, EDINBURGH: RESIDENTIAL PARKING PERMIT LINKED TO ENVIROMENT

What: Proposed parking permits based on carbon dioxide emissions or engine size of vehicle.

Where: Edinburgh, Scotland

Proposed: July 2008

SINGAPORE: CORDON PRICING SYSTEM

What: Cordon variable pricing system where drivers pay to enter the central business and some arterial highways.

Where: City of Singapore – Central business districts and outer ring roads

Method: The current system is electronic road pricing (ERP) and based on a pay-as-you-use principle. Charges are applied in the central business districts from 7:30 am to 7:30 pm; and on the expressways and outer ring roads in the mornings from 7:30 am to 9:30 am. Rates charged are variable priced based on congestion level at time of entry and class of vehicle.

Results:

- 13 percent reduction in traffic in charging zones during periods
- 20 percent increase in average traffic speed
- Increase in carpooling
- shift in vehicle trips from peak to non-peak times

Start Date: 1975 –

Web site: Singapore Government, Land Transport Authority (www.lta.gov.sg)

SPAIN, AUTOPISTA DEL SOL: AUTOPISTA MALAGA TO ESTEPONA

What: Toll Motorway

Where: Toll Motorway between Malaga, Spain and Estepona, Spain

Method: Toll facility uses an electronic toll collection system with on board electronic devices to charge each vehicle.

Fees: The basic fare is assessed based on vehicle type to all users from October to May.

Start Date: Operations began in June 1999

Web page: (<http://www.autopistadelsol.com/ausol1/index.htm>)

SPAIN, BILBAO AREA: ARTXANDA TUNNELS

What: Three tunnels create a triangular access corridor referred to as the Artxanda Tunnels, 1) Ugasko-Txorierrri tunnel; 2) La Salve – Txorierrri tunnel; and 3) La Salve – Ugasko tunnel.

Where: Three tunnels make up the Artxanda Tunnels, which are located between the Getxo coastline to the A-8 motorway in Erletxe, Spain. The tunnels allow for easier access to Bilbao's city center, the international airport and a new corridor in the Asua Valley.

Fees: Fees are reported to be applied during the day peak and off peak, with some holiday rates and nights are free.

Method: The fifteen lane facility uses an electronic toll electronic windshield card system

Web page: (<http://www.tunelesdeartxanda.com/ingles/intro.htm>)

SWEDEN, STOCKHOLM: CONGESTION TAX

What: Full scale congestion tax. In September 2006 the municipality of Stockholm voted in favor of permanent application of the congestion tax.

Where: Stockholm, Sweden – cordon ring covering 29.5 km of central Stockholm

Method: Cordon around city center with 19 control points, traffic cameras with Automatic Number Plate Recognition (ANPR) and transponders. Variable pricing by direction and time of day. Applied Monday through Friday, between 6:30 am and 4:29 pm.

Results:

- Freight users switched to untolled roads;
- Freight users passed costs onto consumers;
- Traffic levels went down 22 percent;
- Public transit use went up 6 percent.

Web site: Swedish Road Administration (http://www.vv.se/templates/page3_21106.aspx)

SWITZERLAND: SWISS HEAVY VEHICLE FEE

What: Nationwide distance-based, variable tolling for Heavy Goods Vehicles. Switzerland's geographically central position in Europe created higher amount of transit traffic particularly HGV traffic, than in other more peripheral countries.

Where: Switzerland

Method: Fee is calculated according to the distance traveled, highest authorized weight, and emissions tariff. Information is collected via on board units (OBUs).

Start Date: January 2001

SOURCES:

; accessed 08/06/2008.

University of Minnesota, Hubert H. Humphrey Institute of Public Affairs: Congestion Pricing. Value Pricing web page. http://www.hhh.umn.edu/centers/slp/vp/vp_org/projects.html; accessed 08/01/2008.

CURACAO - Coordination of Urban Road-user Charging Organizational issues web site. <http://www.curacaoproject.eu/>; accessed 08/06/2008.

DESigs for Interurban Road pricing schemes in Europe web site. <http://www.tis.pt/proj/desire.htm>; accessed 08/06/2008.

Commission on Integrated Transport; <http://www.cfit.gov.uk/>

Tollroad News, <http://www.tollroadsnews.com/>

Appendix 3 – Preliminary Assessment of Washington State’s Ability to Measure Vehicles Mile Traveled

Purpose of Briefing Paper

This paper provides a preliminary assessment of Washington State’s current practices to measure vehicle miles traveled (VMT). Sec 8 of ESSHB 2815 directs the Washington State Department of Transportation (WSDOT) to work with partners to

- Develop measurement tools to accurately measure annual progress towards the VMT benchmarks at the state, regional, and local levels.
- Develop measurement tools to measure the effects of strategies implemented to reduce VMT and distinguish between common travel purposes.
- Measure per capita VMT on a five-year basis.
- Establishing a process to periodically evaluate progress towards VMT benchmarks.
- Establishing a process to measure achieved and projected emissions reductions.
- Establishing a process to recommend whether the benchmarks should be adjusted to meet the state’s overall GHG emissions reductions goals.

As the State adopts strategies to reduce per capita VMT, WSDOT will continue to work with appropriate technical staff in partner agencies and organizations to develop tools and best practices to measure the progress of the respective strategies in meeting the VMT reduction benchmarks.

How VMT is measured in Washington State

The statewide VMT total is calculated from traffic counts taken on state, county, and city roadways. This information is used to meet Federal Highway Administration (FHWA) reporting requirements as part of the Highway Performance Monitoring System (HPMS). HPMS divides roadways into 12 functional⁴ classes and traffic into four vehicle classes. Traffic counts performed as part of the planning and design processes to identify a baseline for future projects are also incorporated into the state VMT calculation. Federal guidelines dictate how this information is collected and reported. These guidelines are necessary because VMT and total lane miles are two factors FHWA uses to determine the distribution of funding among the states.

Traffic is continuously counted and classified at nearly 160 permanent data collection sites in the state. WSDOT rotates about 2,000 temporary sampling sites on a three-year cycle. Each site is sampled for three days continuously. Short-duration hand counts taken during the three days are used to verify mechanical counts. The sampling sites represent a cross-section of functional class and traffic volume categories. About 30 of the permanent sites have the

⁴ Function class explanation is available at: <http://www.wsdot.wa.gov/mapsdata/tdo/functionclass.htm>, Highway Performance Monitoring System Field Manual, Item 17 <http://www.fhwa.dot.gov/ohim/hpmsmanl/chapt4.htm>, WSDOT Design Manual <http://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm>.

ability to weigh the vehicle as part of the classification process. The other permanent sites and the temporary sites use the distance between axles to determine vehicle size and type. Thirteen vehicle classes are counted, such as passenger vehicles, light duty trucks, semi-trucks with one trailer, and semi-trucks with two trailers. These classes are grouped into four categories for reporting to FHWA. Counters can easily distinguish between sedans and large trucks; however, accurately distinguishing between similarly sized vehicles is more difficult, e.g., large pickup trucks and utility/delivery trucks may get misclassified due to their similar characteristics.

In addition to state measurement, 132 cities and 36 counties collect traffic counts on their roads and annually report this information to WSDOT. Not all local governments provide the data each year. For example, last year the response rate was about 94 percent. Three counties do not report traffic counts at all because their principle arterials are state highways. Some cities do not have the resources to count traffic on their roadways every year. These jurisdictions provide best estimates where direct counts are not available.

The equipment needed to count vehicles varies depending on the traffic conditions. Stop and go traffic conditions require more sophisticated equipment than free flow conditions. Radar, sensors in the road, and cameras are three types of technology that are used to count and classify vehicles. Price ranges from several hundred to tens of thousands of dollars. Many vendors offer a wide variety of equipment.

WSDOT uses the counts collected and roadway miles to calculate the statewide VMT. The formula for calculating statewide VMT takes into account lane miles of the different roadway classifications (both functional class and volume category) and traffic volumes on these types of roads. VMT is reported on a calendar year basis. Differences from one year to the next are not clear indicators of changes in driving behavior. Consistent with this, ESSHB 2815 requires WSDOT to report trends based on five-year periods.

At the state level, VMT is a good indicator of the actual miles traveled. Below the county level it is very difficult to accurately assess VMT. Data is not accurate below the county level due to insufficient sample sizes. In addition, because VMT reflects activity across the roadway network, it is not a useful measure for isolated areas, such as the project level.

WSDOT also measures VMT to Commute Trip Reduction (CTR) worksites and within Growth Transportation Efficiency Centers (GTEC) via population and sample surveys. This current practice provides relatively good data on origins and destinations at the zip code level and the commuter VMT between them.

Available approaches for measuring VMT

VMT measurement practices rely on determining the distance traveled by each vehicle. Individual vehicle travel data can be captured through odometer readings or transponders. Surveys can be effective when gathering all the data would be impractical or impossible.

Approach	Agency	Advantage	Disadvantage
Require odometer readings as part of vehicle registration process	Department of Licensing	<ul style="list-style-type: none"> -Most accurate -Could evaluate effect of localized or sector specific strategies -Good way to measure a statewide aggregate 	<ul style="list-style-type: none"> -Require new reporting system -Accuracy of readings reported -May not be to see trends at less than 5 years -Unable to differentiate between in state and out of state travel. Does not capture out of state vehicles in WA.
Survey sample of vehicle owners for annual odometer readings	WSDOT	<ul style="list-style-type: none"> -Select vehicles in areas to match need for information to evaluate localized strategies -Likely more accurate than odometer readings from all drivers. 	<ul style="list-style-type: none"> -Requires new system to capture data -May not work for all strategies -Unable to differentiate between in state and out of state travel. Does not capture out of state vehicles in WA. -ROUGH cost estimate \$50-100K annually, based on estimate received from WSU survey center 12/07.
Use current vehicle count system	WSDOT	<ul style="list-style-type: none"> -System in place and recognized -Good way to measure statewide aggregate -Consistent, national approach -Can measure 5-years trends -No new costs 	<ul style="list-style-type: none"> -Difficult to evaluate localized strategies -Not accurate below the county level
Transponders, such as those used in Oregon study for fee based driving.		<ul style="list-style-type: none"> -Can precisely track where the vehicle travels, and when 	<ul style="list-style-type: none"> -Costly -Privacy issues -Would take time to implement -Is technology ready?

Appendix 5 – VMT Best Practices National and International Synthesis Reports

DOT Climate Change Policies and VMT Reduction: Synthesis

prepared for

Katy Taylor, Director, Public Transportation Division, WSDOT

Anne Criss, Program Lead, Climate Change Team, WSDOT

prepared by

Aaron Poor, TRAC Synthesis Editor

Kathy Lindquist, WSDOT Research Office

Michel Wendt, WSDOT Library

Updated

July 9, 2008

Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WSDOT staff. Online and print sources may include newspaper and periodical articles, NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs and related academic and industry research. Internet hyperlinks in the TSRs are active at the time of publication, but host server changes can make them obsolete.

Request for Synthesis:

Katy Taylor, Director, Public Transportation Division, WSDOT, and Anne Criss, Program Lead, Climate Change Team, WSDOT, requested information on state-DOT policies, targets, and measures for climate change, specifically those involving VMT reduction.

Background:

A search of state DOT and agency Web sites has revealed three state DOTs, Connecticut, Maine, and Massachusetts, actively pursuing a set of climate change initiatives. Many states, often their agencies for environment or energy, are in the process of developing or implementing climate action plans, which may recommend policies for DOTs. Several DOTs publicize programs that lead to emissions reduction, such as transit or multimodal programs, although these programs are not obviously guided by an overarching climate-change policy. Legislation to reduce emissions is on the increase, as well as land-use planning strategies to promote transportation efficiency.

Databases Searched:

- Transport, available through WSDOT Library
- TRIS Online
- Research in Progress
- Google
- Wisconsin DOT Transportation Synthesis Reports

Synthesis Summary:

Categories of publications and resources are as follows:

- State Policies
- National Resources
- WSDOT Research on Climate Change
- Literature Search on VMT Reduction and Greenhouse Gas
- Literature Search on Road Pricing

STATE POLICIES:

California:

Climate Action Program: Moving Forward

The Climate Action Program at the California Department of Transportation (Department) is an interdisciplinary effort intended to promote and facilitate greenhouse gas (GHG) emission reduction measures and greening within the Department. The overall objective is to encourage innovative ways to balance progressive program delivery and responsible environmental stewardship in a way that: 1) transportation strategies, plans, and projects as a whole contribute to the State's GHG emission reduction targets, and 2) proper guidelines, procedures, and a quantifiable set of reporting protocols are in place to monitor GHG footprints and provide feedback for program development and implementation. The Climate Action Program serves as a resource for technical assistance, training, information exchange, and partnership-building opportunities.

<http://www.dot.ca.gov/climateaction.htm>

Climate Change Draft Scoping Plan: a Framework for Change (June 2008 Discussion Draft Pursuant to AB 32, the California Global Warming Solutions Act of 2006)

California Air Resources Board

Excerpt (p. 7 of PDF): ARB must develop a Scoping Plan to lower the state's greenhouse gas emissions to meet the 2020 limit. This Draft Scoping Plan, developed by ARB with input from the Climate Action Team, proposes a comprehensive set of actions designed to reduce overall carbon emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, and enhance public health while creating new jobs and enhancing the growth in California's economy. ARB will revise this Draft Plan based on continuing analysis and public input, and will take the Proposed Scoping Plan, which will be released in early October, to the Board for consideration at its meeting in November, 2008. The measures in the Scoping Plan adopted by the Board will be developed over the next three years and be in place by 2012.

Primary recommended emissions-reduction measures, including several related to transportation, begin on page 29 of the PDF. Secondary measures for the transportation sector begin on page 53 of the PDF. Forthcoming appendices will detail and add measures.

<http://www.arb.ca.gov/cc/scopingplan/document/draftscopingplan.pdf>

Assessment of Local Models and Tools for Analyzing Smart-Growth Strategies, Final Report

DKS Associates, et al, July 2007, California Department of Transportation

Provides case studies of travel models for six California studies (p. 101 of PDF).

http://www.dot.ca.gov/newtech/researchreports/reports/2007/local_models_tools.pdf

California Transit-Oriented Development (TOD) Database, Caltrans

Caltrans provides travel outcome data for each of its TODs, comparing station area vehicles per household and auto mileage per household with that of the surrounding area. The supporting methodology can be found at <http://www.sierraclub.org/sprawl/transportation/holtzclaw-awma.pdf>.

The Mountain View station travel outcomes are provided for example:

<http://transitorienteddevelopment.dot.ca.gov/station/stateViewStationOutcomes.jsp?stationId=1>.

Connecticut:

Connecticut Climate Change Action Plan 2005, Transportation and Land Use Sector

This chapter of the Climate Change Action Plan lists three DOT-related recommended actions:

- RA5, Public Education Initiative on Transportation: Raise the awareness of low GHG emitting vehicles (p. 19 of PDF),
- RA7, **Transit, Smart Growth, and VMT Reduction Package**: Implement a package of transit improvements and land-use policies and incentives to achieve a 3 percent reduction in VMT below the 2020 baseline (p. 23 of PDF), and
- RA8, Multistate Intermodal Freight Initiative (p. 31 of PDF).

http://ctclimatechange.com/documents/TransportationSector_CCCAP_2005.pdf

For progress on the above initiatives, including a detailed description of **VMT reduction measures**, see pages 4 and 6 of the following PDF:

<http://ctclimatechange.com/documents/RAupdatetransportationNov07.pdf>.

Public Act 08-98, Section 5, Item 2, 2008

The Department of Transportation shall, within available appropriations, continue to investigate the potential for improvements to the state's transportation system that will reduce greenhouse gas emissions and coordinate with the northeastern states on regional strategies to incorporate greenhouse gas emission reductions into regional transportation planning, including, but not limited to, high speed rail, light-rail passenger service and freight rail service within the northeast region.

<http://www.cga.ct.gov/2008/ACT/PA/2008PA-00098-R00HB-05600-PA.htm>

2005 Connecticut Climate Change Action Plan

This is the main Web page of the Action Plan with links to report sections and related materials. DOT-related policies are described in the "Executive Summary" and the "Transportation and Land Use" section summarized below.

<http://ctclimatechange.com/StateActionPlan.html>

Florida:

House Bill 7135, 2008

The bill calls for MPOs to minimize greenhouse gas emissions in accord with state transportation plans (p. 71-73 of PDF).

<http://www.flsenate.gov/data/session/2008/House/bills/billtext/pdf/h713503er.pdf>

Maine:

Second Biennial Report on Progress toward Greenhouse Gas Reduction Goals

Maine Department of Environmental Quality, January 2008

Page 10 of PDF: LD 1180, "An Act to Promote Transportation Planning, Increase Efficiency and Reduce Sprawl," (enacted as P.L. 2007, ch. 208) will assist in the implementation of Option 17, "**Lowering the Growth of VMT.**" It establishes a program within the Department of Transportation, funded on a pilot project basis, to provide technical assistance and incentive grants to municipalities to prevent new development along state highways.

Page 12 of PDF: Workgroup on Option 17, "**Lowering the Growth of Vehicle Miles Travelled.**" Composed of some members of the original Transportation Working Group, plus new members, this group is staffed by DEP, Maine Department of Transportation, and the Maine State Planning

Office. It has agreed to focus on ways to promote healthy transit-oriented development in some of Maine's key geographical transportation corridors, and is working with the Center for Clean Air Policy, supported by foundation grants, to gather and analyze Maine-specific data in order to assure that any recommendations will meet the desired level of GHG reductions. In 2007, DOT secured funding for a research project, "Transportation Impacts of Transit-Oriented Development in Maine" that will produce additional policy recommendations to move this option forward.

http://www.maine.gov/dep/air/greenhouse/Report%20to%20NRC%201-18-08_FINAL.pdf

Public Law 2007, Chapter 208, An Act to Promote Transportation Planning, Increase Efficiency and Reduce Sprawl

<http://www.mainelegislature.org/legis/bills/chapters/PUBLIC208.asp>

Maine Climate Action Plan 2004, Volume 1

Department of Environmental Protection, December 2004

GHG mitigation option 17, "**Slowing VMT Growth**," is presented on page 67 of the PDF.

<http://www.maine.gov/dep/air/greenhouse/MaineClimateActionPlan2004Volume%201.pdf>

Massachusetts:

The Green Communities Act, Senate Bill 2768, 2008

The act calls for state transportation agencies to make alternative fuels available on the Massachusetts Turnpike and to advance hybrid and alternative-fuel vehicles (p. 89 of PDF).

<http://www.mass.gov/legis/bills/senate/185/st02pdf/st02768.pdf>

Massachusetts Climate Protection Plan 2004

Office for Commonwealth Development

The following climate change mitigation actions for the Executive Office of Transportation are detailed beginning on page 36:

- Favor Transit-Oriented Development around MBTA Stations,
- Include Energy Use and GHG Emissions Data as Criteria in Transportation Decisions,
- Maintain and Update Public Transit Services,
- Increase Parking at Train Stations to Encourage Use of Public Transit,
- Improve the Efficiency of Transit Vehicle Movement,
- Develop New Bicycle and Pedestrian Policies, Programs, and Facilities,
- Expand Programs to Promote Efficient Travel,
- Seek Opportunities to Reduce Emissions at Logan Airport,
- Improve Aircraft Movement Efficiency,
- Evaluate the Benefits of Expanded Rail and Water Opportunities,
- Promote the Use of Cleaner Vehicles and Fuels in Our Public Transit Fleets,
- Clean Up the Existing Transit Fleet with Less Polluting Fuels,
- Continue to Promote the Use of Clean Diesel Equipment on State-Funded Construction Projects,
- Eliminate Unnecessary Idling of Buses, and
- Use Cleaner Train Engine Technology to Reduce Diesel Soot.

http://masstech.org/renewableenergy/public_policy/DG/resources/2004_MA_Climate_Protection_Plan.pdf

Minnesota:

Transportation and Land Use Technical Work Group: Draft Priority Policy Options for Analysis

Minnesota Climate Change Advisory Group, January 2008

This report describes several climate change policies for the transportation sector. Most call for DOT involvement and some are VMT reduction measures. All options are summarized on page 1. According to a policy briefing

(<http://www.dot.state.mn.us/traffic/data/mtdmcc/CLIMATE%20CHANGE%20ENERGY%20POLICY.ppt>) the measures most related to the DOT are:

- 2, Expand Transit, Bicycle, and Pedestrian Infrastructure (p. 15 of PDF),
- 4, Infrastructure Management (p. 27 of PDF),
- 5, Climate-Friendly Transportation Pricing (p. 30 of PDF),
- 7, “Fix-it-First” Transportation Investment Policy and Practice (p. 36 of PDF),
- 11, Heavy-Duty Idle Reduction (p. 42 of PDF),
- 13, Reduce Maximum Speed Limits (p. 52 of PDF), and
- 14, Freight Mode Shifts: Intermodal and Rail (p. 56 of PDF).

<http://www.mnclimatechange.us/ewebeditpro/items/O3F14766.pdf>

Minnesota Climate Change Advisory Group: Home

<http://www.mnclimatechange.us/index.cfm>

New Jersey:

New Jersey FIT: Future In Transportation

Welcome to the future of transportation in New Jersey. The NJFIT initiative represents a change in direction for the New Jersey Department of Transportation. With NJFIT, we are integrating road building and community building. We are forming partnerships to coordinate development and redevelopment in our towns and cities with transportation needs and investments.

This web site presents case studies of current initiatives, and the goals, toolbox, and partnership opportunities of NJFIT.

<http://www.state.nj.us/transportation/works/njfit/>

New York:

New York State: A Leader in Alternative Fueled Vehicles

New York Office of General Services, January 2008

This is a bulletin on the state’s alternative fueled vehicles program. An item under “Developing the State’s Alternative Fuel Infrastructure” notes, “The Thruway Authority is planning a project to install E-85 [85 percent ethanol, 15 percent gasoline] pumps at Thruway Travel Plazas” (p. 2).

<http://www.ogs.state.ny.us/supportservices/vehicles/cleanfuel/epactInfrastructureUpdate.pdf>

Oregon:

Efforts on Climate Change: Fact Sheet—March 2008

Oregon Department of Transportation

The Oregon Department of Transportation recognizes that the transportation sector in Oregon generates significant greenhouse gases. In fact, transportation sources are responsible for over a third of emissions in the state—roughly the same share as the electric power sector. The department understands that in order to meet the greenhouse gas reduction goals laid out by

Governor Kulongoski and the legislature, the state will need to make major changes in the transportation sector.

<http://www.oregon.gov/ODOT/SUS/docs/EffortsOnClimateChange2008.pdf>

Pennsylvania:

Rail Freight Funding Programs

Rail Freight Assistance Program

The Rail Freight Assistance Program (RFAP) provides financial assistance for investment in rail freight infrastructure. The intent of the Program is to (1) preserve essential rail freight service where economically feasible, and (2) preserve or stimulate economic development through the generation of new or expanded rail freight service.

<http://www.dot.state.pa.us/Internet/Bureaus/pdBRF.nsf/infoGrantProgram?OpenForm>

South Carolina:

Reducing Emissions thru Congestion Mitigation, SCDOT

Bicycles, Pedestrians Accommodations and Intermodal Planning

SCDOT was the first DOT in the southeast to adopt a policy affirming that bicycle and pedestrian accommodations be a routine part of planning, design, construction and operating activities and be included in the everyday operations of our transportation system. Highways are being viewed as more than simply a place for cars and trucks, they are also facilities that will allow for alternative modes of transportation and easier commutes. A prime example of this is the bicycle/pedestrian lane on the new Cooper River Bridge. This lane is separated from traffic and is used by hundreds of people each day.

SCDOT is also identifying and protecting abandoned rail corridors across the state to promote the future use of passenger rail and shared bicycle and pedestrian paths. These modes of transportation have the potential of reducing carbon emissions -promoting good health for the citizens of our state, as well as reducing the green house effect on our environment.

To further reduce emissions, SCDOT has encouraged Mass Transit providers to install bike racks on buses. This increases mobility for customers and encourages the use of alternative transportation. The Central Midlands Regional Transit Authority (CMRTA) has installed bike racks on all of the CMRTA busses and providers throughout the state are beginning to follow their lead. Bike racks have also been installed at the SCDOT Headquarters building in Columbia, encouraging visitors and employees to use two-wheeled transportation- an environmentally friendly free form of transportation.

Intermodal connectivity is another tool we use to enhance transportation, giving travelers more options and improved convenience. SCDOT is developing a 20-year Intermodal Plan that will improve connectivity between highways, airports, bus terminals, seaports, rail, public transit, bicycle and pedestrian facilities. By working together with our partners in each of these areas, the state will benefit by having a well thought-out transportation system.

Twenty to twenty-five percent (20-25%) of morning rush hour traffic is attributed to adults driving their children to school. (*U.S. Department of Transportation, National Highway Traffic Safety Administration, "Safe Routes to Schools," DOT HS 809-497: Sept. 2002, 73.*) The South Carolina [Safe Routes to School Program](#) provides guidance and funding to make walking and cycling more appealing transportation alternatives for students in kindergarten through eighth grades. By enabling and encouraging children to walk and bicycle to school, we reduce traffic congestion and improve air quality. The Safe Routes to School Program also explores reducing the number of

children that must be bused within a reasonable walking distance, encourages carpooling, and proposes no idling policies in school pick-up lines.

<http://www.scdot.org/environmentalstewardship/bikes.shtml>

SMARTRIDE

SCDOT partners with DHEC, and the SC Energy Office to help improve air quality and reduce imports of foreign oil by using the SmartRide commuter service. Currently, SmartRide offers two bus routes that provide service between Camden and downtown Columbia, and between Newberry and downtown Columbia. The SC Department of Transportation offered free fares on the SmartRide commuter service between July 1 and September 30, 2007 on days DHEC forecasted Ground-Level Ozone Action Days. SmartRide has proven to be popular with many people who live in outlying areas and commute to downtown Columbia on a daily basis.

<http://www.scdot.org/environmentalstewardship/smartride.shtml>

Traffic Signal Coordination

Several tools used in the reduction of congestion and improving traffic flow are computer generated traffic signal coordination and improved intersection design standards. These efforts reduce stop-and-go traffic and vehicle idle times, saving fuel and shortening commuting times.

SCDOT Traffic Engineers monitor traffic signal systems to ensure optimum performance. Properly managed traffic signal systems can improve highway capacity up to 20%*. (*footnote: based on national studies and can deliver up to a 40:1 benefit to cost ratio) In the past year, our Traffic Engineers have retimed 23 signal systems. There are currently 208 signal systems in South Carolina. Several large "retiming" projects managed by SCDOT are currently in progress in Columbia, Rock Hill, Spartanburg and Charleston- major urban areas. There are currently plans to retime 20 signal systems in Richland, Lexington, Florence, Bluffton and the Myrtle Beach area. New signal systems are also planned in Georgetown and Spartanburg County in the near future.

<http://www.scdot.org/environmentalstewardship/trafficsignals.shtml>

Tennessee:

TDOT Biofuel Program

TDOT Plays Key Role in Governor's Alternative Fuel Initiative

Tennessee Governor Phil Bredesen is dedicated to the protection of our natural resources, our environment, our economy and the health of Tennessee's citizens. That commitment includes a focus on promoting the efficient use of natural resources, including renewable alternative fuels, such as biodiesel and ethanol ("biofuels"), made from agricultural products.

<http://www.tdot.state.tn.us/biofuel/default.htm>

Virginia:

Senate Bill 233, 2008

Revises code regarding the Statewide Transportation Plan such that the plan will include quantifiable measures and achievable goals relating to greenhouse gas emissions.

<http://leg1.state.va.us/cgi-bin/legp524.exe?081+ful+SB233E>

Transportation and Land Use

The planning and construction of new highways and transportation improvements affects existing land uses and plans for future development. Types and pattern of development influence and impact travel patterns and demand for transportation facilities.

In Virginia, land use is the prerogative of local governments, while transportation planning and funding decisions are generally made at the state level.

Improving the coordination between transportation and land-use planning is essential for ensuring mobility throughout the commonwealth.

The Virginia Department of Transportation (VDOT) is working with various stakeholders to develop regulations to improve the coordination between transportation and land-use planning in Virginia.

Through these regulations and requirements, VDOT strives to provide a balanced and efficient transportation system for citizens of the commonwealth.

<http://www.virginiadot.org/projects/landuse.asp>

NATIONAL RESOURCES:

Pew Center on Global Climate Change: U.S. States and Regions

States and regions across the country are adopting climate policies, including the development of regional greenhouse gas reduction markets, the creation of state and local climate action and adaptation plans, and increasing renewable energy generation.

[Read More](#) . . .

<http://www.pewclimate.org/states-regions>

Center for Clean Air Policy Transportation Emissions Guidebook

This interactive website provides an index to two categories of mitigation policies: (1) land use, transit, and travel demand management, and (2) vehicle technology and fuels. The site provides briefs for each policy, which include an overview, emissions-reduction potential, implementation strategies, case studies, and links to resources. There is also an emissions-reduction calculator and a policy comparison matrix.

http://www.ccap.org/safe/guidebook/guide_complete.html

Updated List of Select State Global Warming Policies and 2008 Bills

National Caucus of Environmental Legislators, February 2008

http://www.ncel.net/newsmanager/news_article.cgi?news_id=184

Primer on Transportation and Climate Change

AASHTO, May 2008

This report identifies and summarizes five national data sources from the FHWA, EPA, and DOE that underlie most of the independent research on transportation-related GHG emissions (excerpts, p. 23):

- *FHWA, Highway Statistics*: The report includes detailed break-downs of VMT as well as total fuel consumption, but does not include data on GHG emissions.
- *FHWA, Conditions and Performance Report*: Important information in this report includes vehicle miles of travel (VMT) growth rates from 1984 through 2004, as well as projected VMT growth trends through 2024. Notably, the FHWA forecast of VMT growth is somewhat higher than the forecast in DOE's *Annual Energy Outlook*.
- *U.S. DOE, Annual Energy Outlook*: The report provides a 25-year forecast of various measures of energy usage for all sectors of the economy. The report includes forecasts for VMT, fuel economy (miles per gallon), and energy usage (measured in BTUs), all of which are broken down by vehicle type. The report also provides CO₂ emissions for the transportation sector as a whole.

- *U.S. EPA, Inventory of Greenhouse Gas Emissions and Sinks*: The report includes historical data, not future projections. It includes data on VMT, fuel economy, and GHG emissions for various classifications of transportation vehicles. It also includes historical data on trends in use of ethanol and other biofuels.
- *U.S. DOE, Transportation and Energy Data Book*: [This report] is a compendium of primarily historical data regarding energy usage, transportation vehicle characteristics (e.g., fuel economy), alternative fuel usage, GHG emissions, economic conditions, and other factors. It includes some projections of future fuel usage, but does not include projections specifically for VMT growth or GHG emissions.

Additional sources can be found in the Reference Materials section (p. 49). Noted resources include TRB's Appendix B to Special Report 290 (2008), which provides an in-depth review and explanation of the transportation sector's contribution to GHG emissions and a discussion of potential strategies for reducing those emissions, and USDOT's online list of publications, <http://climate.dot.gov/publications/index.html>.

Available from the WSDOT Research Library and at <http://downloads.transportation.org/ClimateChange.pdf>

Securing a Clean Energy Future—Greener Fuels, Greener Vehicles: a State Resource Guide

National Governors Association, February 2008

Excerpt from Page 24:

Overcoming Barriers: State Examples: Governors across the country are applying one or more types of policy tools to build sustainable alternative fuel sources, infrastructure, and advanced vehicle markets. Some of these state policy actions are described below.

<http://www.nga.org/Files/pdf/0802GREENERFUELS.PDF>

Backgrounder: State and Regional Greenhouse Gas Initiatives (Energy Sector)

National Governors Association, October 2006

Summary of regional GHG initiative programs.

<http://www.nga.org/Files/pdf/0610GREENHOUSE.PDF>

Transportation and Global Warming: Defining the Connection and the Solution

CTC & Associates LLC and WisDOT Research & Library Unit, July 2007

This transportation synthesis report provides background on transportation's contribution to global warming and a state-by-state list of DOT and local government initiatives. Research articles on CO₂ emission reduction strategies are cited or included for the following subjects:

- reducing GHG emissions through land-use development (The Kyoto Protocol and Sustainable Cities: Potential Use of Clean-Development Mechanism in Structuring Cities for Carbon-Efficient Transportation, *Transportation Research Record No. 1983*, 2006);
- using byproducts such as fly and bottom ash for embankment construction (p. 15 of the pdf);
- developing policies to target behavioral differences of diesel and hybrid car buyers (p. 35 of the pdf);
- implementing an emission permit trading program (p. 50 of the pdf); and
- measuring emissions reductions of roundabouts (p. 66 of the pdf).

<http://www.dot.wisconsin.gov/library/research/docs/tsrs/tsrglobalwarming.pdf>

Transit-Oriented Development: Developing a Strategy to Measure Success

John Renne and Jan Wells, February 2005, *NCHRP Research Results Digest 294*

From Summary: This digest offers a strategy to systematically evaluate the potential success of transit-oriented development. The digest identifies and evaluates various indicators of the impacts of transit-oriented development, provides the results of a survey of transit-oriented development indicators, and identifies ten indicators that can be used to systematically monitor and measure impacts.

http://trb.org/publications/nchrp/nchrp_rrd_294.pdf

WSDOT RESEARCH ON CLIMATE CHANGE:

Transportation-Efficient Land Use Mapping (TELUMI): Phase 3 of Integrating Land Use and Transportation Investment Decision-Making

Anne Vernez Moudon, UW, June 2005, Publication No. WA-RD 620.1

The objective of this project was to devise a conceptually simple tool that operationalized the complex relationship between land use and travel behavior. The TELUMI is a set of maps that depicts how the region's urban form affects overall transportation system efficiency.

<http://www.wsdot.wa.gov/Research/Reports/600/620.1.htm>

Options for Making Concurrency More Multimodal

Mark Hallenbeck, Dan Carlson, Keith Ganey, Anne Vernez Moudon, Luc de Montigny, and Ruth Steiner, December 2006

This study's purpose, by legislative intent, is to examine and propose multimodal improvements to concurrency. These include both alternative ways to measure the availability and effectiveness of multimodal transportation systems, and ways to use those measurements to implement more effective multimodal transportation systems that support the intent of the Growth Management Act.

<http://depts.washington.edu/trac/bulkdisk/pdf/ConcurrencyOptions.pdf>

Travel Behavior, Emissions and Land Use Correlation Analysis in the Central Puget Sound

Lawrence Frank and Company, Inc., Mark Bradley, Keith Lawton Associates, July 2005, Publication No. WA-RD 625.1

A growing body of research documents that land use relates with travel mode choice, distances and time spent traveling, and household level vehicle emissions. However, to date little work has been done at a sufficiently disaggregate scale to gain an understanding of how local governments should alter their land use policies and plans to reduce vehicle use and encourage transit and non-motorized forms of travel. This study of the four county Central Puget Sound region links parcel level land use data with travel data collected from the Puget Sound Household Travel Survey (PSHTS).

The primary aim of the study is to describe how measures of land use mix, density, and street connectivity where people live and work influences their trip making patterns including trip chaining and mode choice for home based work trips, home based non-work trips, and mid day trips from work. Land use measures are developed within one kilometer of the household and employment trip ends in the survey. Four based models are developed to estimate the relative utility of travel across available modes when controlling for level of service, regional accessibility to employment, and sociodemographic factors.

A secondary aim of the project is to estimate the linkages between land use and household generation of Oxides of Nitrogen and Volatile Organic Compounds that are precursors to the formation of harmful ozone.

<http://www.wsdot.wa.gov/Research/Reports/600/625.1.htm>

Travel Indicators and Trends in Washington State

Anne Vernez Moudon, Gwen Rousseau, and D.W. Sohn, April 2005, Publication No. WA-RD 615.1

This review of travel indicators in Washington State aims to understand similarities and differences between the state and the nation and to detect changes or special conditions that need to be considered in the future. The work is intended to support general transportation policies and future state-level transportation plans.

None of the travel indicators reviewed strongly suggests that travel conditions in the state stand out in the national context. Two factors are prime in their association with travel demand: household income and development density. Stagnant income explains why the demand for car travel has slowed over the recent past, yet future demand for car travel may increase if the economy improves. On the other hand, demand could remain stable if development density continues to increase.

Residential and population densities are positively associated with demand for modes other than single-occupancy vehicle (SOV) travel. Living in more compact residential areas and in alternative housing types, and renting versus owning a home, also relate to lower demand for SOV travel.

Even at the aggregate level of national data, the Puget Sound region's transportation context differs from that of rural or other urbanized regions in the state. State policies need to recognize at least three different markets for transportation, which are found in rural, small town, and metropolitan areas.

Overall, Washington State needs to stay tuned to national projections about the likely impacts on travel demand and transportation of general economic trends, the slow down in household formation, growth in car ownership among new immigrants, an aging population with changing driving patterns, and population growth in densely populated areas --where transportation systems investments and land-use policies can affect future travel behavior.

<http://www.wsdot.wa.gov/Research/Reports/600/615.2.htm>

An Analysis of Relationships Between Urban Form (Density, Mix, and Jobs: Housing Balance) and Travel Behavior (Mode Choice, Trip Generation, Trip Length, and Travel Time)

Lawrence Frank, July 1994, Publication No. WA-RD 351.2

This project is part of a research agenda to discover ways to plan and implement urban forms that reduce dependence on the single occupancy vehicle (SOV). The purpose of this project was to empirically test the relationship between land use density, mix, jobs-housing balance, and travel behavior at the census tract level for two trip purposes: work and shopping. This project provides input into policies at the national, state, and local level targeted at the reduction of SOV travel and for urban form policies.

<http://www.wsdot.wa.gov/Research/Reports/300/351.2.htm>

Relationships Between Land Use and Travel Behavior in the Puget Sound Region

Lawrence Frank and Gary Pivo, September 1994, Publication No. WA-RD 351.1

<http://www.wsdot.wa.gov/Research/Reports/300/351.1.htm>

LITERATURE SEARCH ON VMT REDUCTION AND GREENHOUSE GAS:

Modeling Land Use, Bus Ridership, and Air Quality: Case Study of North River Industrial Corridor in Chicago

Jie Lin and Santosh Mishra, 2006, Conference Title: Transportation Research Board 85th Annual Meeting, Washington, Held: 20060122-20060126

Abstract. Public transportation is a means to reduce vehicle miles of travel and vehicle emissions from automobile travel. This paper presents a demonstrative study of predicting potential automobile VMT and emissions reductions due to transit service improvement by using a simple GIS-aid computer tool. The prediction procedure involves a bus ridership model that incorporates transit policy and land use indicators, prediction of transit demand of new or modified existing service by applying the ridership model in GIS spatial analysis, and finally estimation of VMT and emissions reductions. We applied this approach to a proposed new Chicago Transit Authority (CTA) bus service in the North River Industrial Corridor in City of Chicago. Bus ridership was

found to be strongly correlated with bus service measures such as bus headways, run miles and service frequency; residential and commercial land area and value within a quarter mile buffer zone of a bus route, and other competing transit services available in the same area. We further demonstrated that the ridership models combined with GIS tools and MOBILE6 models could be a useful screening tool for VMT and emissions reduction estimation for CMAQ type of projects. Model limitations are also discussed in the paper.

Heuristic policy analysis of regional land use, transit, and travel pricing scenarios using two urban models

C.J. Rodier, R.A. Johnston, and J.E. Abraham, July 2002, *Transportation Research Part D* 7(4): 243-54, ISSN: 1361-9209

Abstract: To address some of the uncertainties inherent in large-scale models, two very different urban models, an advanced travel demand model and an integrated land use and transportation model, are applied to evaluate and use, transit, and auto pricing policies in the Sacramento, CA (US), region. The empirical and modeling literature is reviewed to identify effective land use, transit, and pricing policies and optimal combinations of those policies and to provide a comparative context for the results of the simulation. The study illustrates several advantages of this approach for addressing uncertainty in large-scale models. First, as Alonso [Predicting the best with imperfect data, *AIP Journal* (1968)] asserts, the intersection of two uncertain models produces more robust results than one grand model. Second, the process of operationalizing policy sets exemplifies the theoretical and structural differences in the models. Third, a comparison of the results from multiple models illustrates the implications of the respective models' strengths and weaknesses and may provide some insights into heuristic policy strategies. Some of the key findings in this study are (1) land use and transit policies may reduce vehicle miles traveled (VMT) and emissions by about 5-7%, and the addition of modest auto pricing policies may increase the reduction by about 4-6% compared to a future Base Case scenario for a 20-year time horizon; (2) development taxes and land subsidy policies may not be sufficient to generate effective transit-oriented land uses without strict growth controls elsewhere in the region; and (3) parking pricing should not be imposed in areas served by light rail lines and in areas in which increased densities are promoted with land subsidy policies.

Index of Transportation Measurement Quantification Efforts: Methodology Matrix

D.R. Luscher, D.A. Coleman, D.K. Popek, and F. Kamakate, September 1998, ARCADIS Geraghty & Miller, Inc., and Environmental Protection Agency—Regional and State Programs Division, Report No.'s SJ007262 and EPA420-98-018

Abstract: The purpose of this work assignment was to develop a comprehensive index of methodologies used in assessing transportation measures and other non-mandatory programs. Quantification refers to any effort to numerically evaluate transportation measures, or other related measures, in terms of developing air quality benefits, program costs, VMT reductions, trip reductions, and/or cost effectiveness. This extensive matrix was produced for planners and policy makers to use when they need to evaluate the travel and emissions impact of their own existing or planned transportation measures.

LITERATURE SEARCH ON ROAD PRICING:

Data Requirements to Support Road Pricing Analyses.

Johanna Zmud, April 2006, Volpe National Transportation Systems Center and Department of Transportation—Office of the Secretary of Transportation, Conference Title: Expert Forum on Road Pricing and Travel Demand Modeling, Alexandria, Held: 20051114-20051115, Report No. DOT-OST/P-001-06

Abstract: This paper discusses data requirements to support pricing analyses. It focuses on road pricing analyses as they relate to infrastructure financing and congestion management. Infrastructure financing can be defined as either revenue generation via toll roads or capacity enhancement via more efficient use of existing roadway lanes. Congestion management under the rubric of travel demand management (TDM) may include strategies to reduce peak-period

vehicle traffic or shift travel to alternative modes or times of the day. The paper has four parts. In the first part, an overview of road pricing is presented, along with associated background information including pricing history, its impetus, and pricing options. This information is followed by areas of intersection between road pricing and travel demand modeling. Given the complexity of road pricing analyses, the paper then presents recommended data requirements at three levels: policy, strategic, and tactical. The paper concludes with ideas for future research, as well as recommended criteria for selecting data items.

Congestion and Traffic Management

R.W. Poole, Jr., 2001, *Contributions in Economics and Economic History* (224): 59-77, ISSN: 0084-9235

Abstract: Transportation economists view urban traffic congestion as an imbalance of supply and demand, caused by the lack of market pricing of roadway use. Road pricing, in which higher prices are charged at peak times and lower prices are charged during off-peak hours could help alleviate this imbalance. There is strong political opposition to road pricing, but recent congestion pricing pilot programs suggest that technically and operationally successful forms of road pricing can be developed. The most successful programs thus far have high-occupancy/toll (HOT) lanes allowing vehicles not meeting the car-pooling requirement to purchase excess capacity in those lanes. The article suggests that a reform of highway finance is necessary to make road pricing feasible since the current financing and ownership of U.S. roadways is too convoluted. New technologies, such as electronic toll collection systems, vehicle-miles-traveled technologies, and a global positioning system-based virtual tolling system, could also help make road pricing a reality. This article suggests a new approach in which the road system becomes a public utility, run either as government utility or franchised to private firms on a long-term basis. The article concludes by suggesting the following policy changes: defederalize the highway system; convert high occupancy vehicle lanes to HOT lanes; use annual registration fees for local streets and roads; end "double taxation" of paying both tolls and fuel taxes; enact public-private partnership laws; and develop national standards for electronic tolling.

Where Are We Going? Transportation Demand Management in the Next Millennium

P.L. Winters, 2000, Association for Commuter Transportation, Conference Title: ACT 2000 International Conference: Imagine the Possibilities, Orlando, Florida, Held: 20000917-20000920

Abstract: This paper will discuss how technology, policies, and procedures fit together to help alter travel behavior in our mobile society. Together these factors can influence travelers' choice of mode, departure time, route, or willingness to pay. These modified travel behaviors will help achieve goals such as reductions in traffic congestion and air pollution. Transportation demand management (TDM) is the all-inclusive term given to this variety of measures used to improve the efficiency of the existing transportation system. TDM products and services include encouragement to use alternatives to the single-occupant vehicle such as carpools, vanpools, transit, bikes, and walking. Alternative work-hour programs such as the compressed workweek, flextime, and telecommuting are also TDM strategies, as are parking management tactics such as preferential parking for carpools and parking pricing. The need to influence travel behavior becomes clearer as recent trends are examined. During the past several decades, commuting behavior could be described as more people in even more vehicles traveling to more places. Although the population increased nearly 22 percent from 1976 to 1996, licensed drivers increased 34 percent. The suburb-to-suburb commute became the dominant commuting pattern. Not only were there more drivers, there were 77 percent more vehicle miles of travel (VMT). Nevertheless, supply has increased at a much slower rate than demand. When adjusted for inflation, highway capital outlay in constant dollars increased by 56 percent from 1976 to 1996, but road mileage only increased 2 percent. In fact, highway expenditures by all units of government, with inflation removed, were about 56 percent of what they were for each vehicle mile of travel in 1976. The result of these growth and demographic trends is more traffic congestion. If present trends continue, increases in the total number of vehicles on the road and in the amount they are driven will continue to cause significant traffic delays and overwhelm the

benefits gained from improved emissions controls on vehicles. Therefore, viable alternatives to single-occupant driving need to be available and used in order to ensure the healthy air quality needed and to maintain the personal mobility we all depend on. As we look to the future, TDM professionals face the uncertainty with optimism and renewed vigor.

Proposal for a National Mileage Based Tax

Adeel Z. Lari and Kenneth Buckeye, 1999, ITS America, Meeting (9th: Washington, D.C.), *New thinking in transportation: conference proceedings*, Publisher: Minnesota Dept. of Transportation—Office of Alternative Transportation Financing

Abstract: In Minnesota, as with virtually all other states, the motor fuel tax is the primary method for collecting road user charges. In addition, a significant portion of revenue is collected through motor vehicle registration fees which vary with the sale price and age of the vehicle. Although registration fees have grown in recent years, the rate of increase in motor-fuel consumption has fallen short of the increase in vehicle miles traveled due to increasingly efficient vehicles. This problem will likely be exacerbated in the future with demands for increased efficiency and as more vehicles are developed which use alternative sources of energy. One proposal to create a more optimal user fee system is a concept called the Mileage Based Tax (MBT). A primary motivation for a MBT is to close the widening gap between fuel consumption and vehicle miles of travel. Under such a concept revenue would increase in direct proportion to increased travel. The MBT, like other taxes, could be indexed to inflation thereby helping to assure that revenues keep pace with costs. Coupled with advanced electronics now becoming commonplace in motor vehicles the MBT may also be utilized to vary charges by type of vehicle, time of day, and route of travel. Primary challenges for the MBT concept are in the area of public acceptance and technical aspects of implementation.

Transportation Financing: Vehicle Miles Traveled (VMT) Assessment and Measurement: A Critical Review and Evaluation of Alternative Revenue Sources

Reza Nevai, July 2007, California Department of Transportation, Source Notes: This document consists of two reports: Transportation Pricing: Vehicle Miles Traveled (VMT) Assessment and Measurement: Executive Summary, and 2) Transportation Financing: Vehicle Miles Traveled (VMT) Assessment and Measurement: A Critical Review and Evaluation of Alternative Revenue Sources: White Paper

Abstract: This study provides a framework for the analysis and evaluation of transportation pricing, and in particular, vehicle miles traveled (VMT). It presents a critical analysis of transportation pricing issues and develops a realistic notion of market-based measures. The study evaluates transportation revenues and financing reform using different transportation sensitive criteria and strategic scenarios, along with the application of the VMT method. A framework is used to evaluate alternative revenue sources and provide an assessment in terms of adequacy and stability. Options are given that are available for reforming the existing financing system. Recommendations are presented underlining the packaging of potential new revenue sources and improvement measures.

Transportation Pricing Strategies for California: An Assessment of Congestion, Emissions, Energy, and Equity Impacts, Final Report

E. Deakin, G. Harvey, R. Pozdena, and G. Yarema, November 1996, Deakin Harvey Skabardonis, Source Notes: This report was prepared for the California Air Resources Board (CARB) of the California Environmental Protection Agency and the Federal Highway Administration (FHWA); This report was funded and co-sponsored by FHWA, CARB, Caltrans, the Los Angeles County Metropolitan Transportation Authority, Southern California Association of Governments, and the San Diego Association of Governments; Contract/Grant No. 92-316 (CARB)

Abstract: This study investigated five categories of transportation pricing measures - congestion pricing, parking charges, fuel tax increases, vehicle miles traveled (VMT) fees, and emissions fees. Advanced travel demand models were used to analyze these measures for the Los

Angeles, Bay Area, San Diego, and Sacramento metropolitan areas. The analyses indicate that transportation pricing measures could effectively relieve congestion, lower pollutant emissions, reduce energy use, and raise revenues. For example, a combination of congestion pricing, employee parking charges, a 50 cent gas tax increase, and mileage and emissions fees would reduce VMT and trips by 5-7% and cut fuel use and emissions by 12-20%, varying by region. Because auto use and its impacts are quite inelastic to price, sizable increases in revenue can be obtained with relatively little effect on travel; conversely price increases must be large to obtain sizable reductions in travel and its externalities. Citizen reactions to prototype transportation pricing measures were explored in focus groups, and feedback from public officials and private organizations was obtained through meetings and interviews. First reactions were skeptical, but many were more favorably inclined after considering alternatives to pricing. Public acceptance would be increased by earmarking revenues for transportation improvements and providing independent oversight of revenue collection and expenditure. Federal and state laws govern and in some cases restrict the implementation of pricing strategies, and these and other institutional and administrative issues would have to be resolved before proceeding with specific measures.

Transport, Land-Use and the Environment, Chapter 10: Short-Term Impact Analysis of Pricing Strategies on VMT (Vehicle Miles Travelled) Reduction

Y. Hayashi, J.R. Roy, T.J. Kim, and P. Hanley, 1996, *Transport, Land-Use and the Environment* 1996: 191-212, Report No. 0-7923-3728-X

Abstract: In order to comply with standards imposed by the US Environmental Protection Agency a number of strategies are being implemented across the United States. This paper assesses the impact of some of these transportation control measures, in particular pricing strategies, on the reduction of mobile sources of emissions and vehicle miles travelled. The case of Chicago is examined. Using data from the Chicago Area Transportation Study, a number of scenarios are tested which affect the cost of driving. These include various combinations of increases in fuel costs and parking charges. The most effective transportation control measures are identified.

Congestion Pricing and Motor Vehicle Emissions: An Initial Review

R. Guensler and D. Sperling, 1994, *Transportation Research Board Special Report* (242): 356-379, ISSN: 0360-859X, Report No. 0309055059

Abstract: This paper examines the air quality impacts likely to result from congestion pricing. Key questions addressed are: What effect will congestion pricing have on trip making and VMT? How will traffic volumes change on priced and unpriced routes? How will the change in traffic volume affect the operating environment of vehicles (examined as a change in average vehicle speed under the current modeling regime) and the resulting emission rates per unit of vehicle activity? What changes in vehicle emissions are expected to result from overall changes in vehicle activity and emission rates? In this paper, the focus is on the effects of postulated changes in average vehicle operating speeds on emission rates. The existing emission modeling regime for average speed changes is examined, and a range of emission rate changes based on the projected changes in average vehicle operating speeds is provided. Using projected changes in average vehicle speeds provided by Harvey (in this volume, pp 89-114), percentage changes in emission rates associated with the implementation of four congestion pricing scenarios are examined.

Feasibility of Employee Trip Reduction as a Regional Transportation Control Measure

M.R. Lupa, 1994, *Transportation Research Record* (1459): 46-52, Source Notes: This paper appears in *Transportation Research Record* No. 1459, *Parking and Transportation Demand Management*, ISSN: 0361-1981, Report No. 0309060664

Abstract: The passage of the Clean Air Act Amendments of 1990 resulted in the introduction of a number of transportation control measures (TCMs) that are designed to reduce the number of vehicle kilometers traveled in ozone nonattainment regions. Employee trip reduction (ETR) is one of those strategies. A policy analysis of ETR and a preliminary cost comparison of ETR among TCMs are presented. ETR is an evolving TCM and, as such, provides an arena for strategic planning using many tools, including direct political action, classical economics, technological

implementation, pricing, and regional consensus building. Thus far ETR has not affected regional vehicle miles traveled, and yet it is premature to say that it has no effect on regional clean air goals. ETR strategies cannot successfully be separated from related mode split component strategies such as transit expansion, transit user subsidy, and parking fees; this synergistic quality complicates freestanding analysis of ETR. Finally, the positive and negative results of ETR indicate that pricing of some sort is the most direct means of securing behavioral change.

An Assessment of Travel Pricing Strategies

Regional Transportation Authority, September 1994

Abstract: A number of economists who have looked at our transportation problems have concluded that one of the key reasons we drive so much is because driving and the use of roads is underpriced. When prices are low, or the price is not perceived for what it is, i.e. the market signal is weak, then demand will not be tempered by market signals. There are a number of strategies by which market signals for travel demand can be strengthened. This report describes four major pricing strategies that recently have been discussed, analyzed and reviewed (and in a few cases implemented) by transportation planners, analysts and economists. The travel pricing strategies discussed in this report are: congestion pricing, parking pricing, fuel taxes and vehicle miles traveled/emission fees.

Urban Transportation: Reducing Vehicle Emissions with Transportation Control Measures

General Accounting Office, August 1993, Source Notes: Report to Congressional Requesters, Report No. GAO/RCED-93-169

Abstract: In this report, the General Accounting Office (GAO) (1) reviews evidence on the effectiveness of transportation control measures (TCMs) in reducing pollution and (2) assesses the prospects for implementing TCMs in areas that have not attained federal air quality standards for ozone and carbon monoxide (CO). To meet these objectives, among other things, GAO conducted a nationwide survey of 119 metropolitan planning organizations (MPOs) in ozone and CO nonattainment areas. Briefly, GAO found the following: The traditional TCMs listed in the Clean Air Act Amendments of 1990 (CAAA) are projected to reduce regionwide hydrocarbon and CO emissions from 0 to 5% of total emissions. A strong consensus was found among transportation planners that TCMs are complementary programs that will supplement improvements in emissions technology, cleaner fuel, and vehicle inspection and maintenance programs. TCMs will play a growing role in transportation planning. The Intermodal Surface Transportation Efficiency Act (ISTEA) and CAAA contain funding and enforcement provisions that will encourage states to emphasize TCMs in the future. 56% of the surveyed MPOs stated that TCMs would receive strong emphasis in their transportation programs in the next 5 years (1993-98). Only 8% reported that TCMs had received strong emphasis in their programs during the last 5 years (1987-92). GAO found a strong consensus that market-based TCMs--financial disincentives that change travel behavior, such as gasoline taxes or emissions fees--may be more effective than traditional TCMs in reducing automobile use. Department of Transportation and Environmental Protection Agency officials are encouraging states to implement market-based TCMs. However, since these measures add to the cost of driving, they are economically and politically painful; 80% of the MPOs surveyed agreed that public resistance to these measures made their implementation highly unlikely. Localities that find market-based TCMs unfeasible may obtain maximum benefits from traditional TCMs through several approaches, including focusing on specific congested corridors and implementing TCMs that reduce the number of trips as well as the number of vehicle miles traveled.

Commuting, Congestion, and Pollution: The Employer-Paid Parking Connection

D.C. Shoup and R.W. Willson, September 1992, Reason Foundation, Report No. Policy Insight No. 147

Abstract: Urban areas increasingly face problems associated with traffic congestion and vehicle air emissions. Employer-paid parking--a form of matching grant whereby an employer offers to pay the cost of parking if employees are willing to pay all other costs of driving to work--

contributes to the tendency of employees to drive alone to work. In Los Angeles, the average employer-paid parking subsidy is equivalent to 11 cents per mile traveled to and from work. Thus, imposing a congestion toll of 11 cents per vehicle mile traveled would raise the cost of driving to the Los Angeles CBD by only as much as employer-paid parking already lowers it. A survey of 5,060 commuters to downtown Los Angeles was used to estimate how employer-paid parking affects transportation system performance. The results show that employer-paid parking: increases the number of solo drivers by 44%; increases parking demand by 34%; increases automobile vehicle miles traveled to work by 33%; increases gasoline consumed for driving to work by 33%; increases the cost of automobile travel to work by 33%; and increases the total cost of parking at work and driving to work by 33%. Although employers spend an average of \$750 per employee per year for parking subsidies (\$563 in replaced employee spending, and \$187 in stimulated spending), the employees' own average spending for parking and driving declines by only \$183 per year. The net effect is that the employer must spend \$4.10 on parking subsidies for every \$1 the employee saves on the cost of parking and driving. This disproportion between the large amount employers pay and the small amount employees save is explained by employer-paid parking's strong stimulus to spending on both parking and driving: the stimulus to parking demand inflates what employers have to pay, and the stimulus to driving diminishes what the employees save. In offering to pay for their employees' parking at work, employers are responding to the Internal Revenue Code's so-called "special rule for parking", which defines employer-paid parking subsidies as a "working condition fringe" that is exempt from income taxation. Given the political difficulty of taxing employer-paid parking subsidies, an alternative policy would be to amend the special rule for parking in Paragraph (4) of Section 132(h) as follows: The term "working condition fringe" includes parking provided to an employee on or near the business premises of the employer if the employer offers the employee the option to receive in lieu of the parking, the fair market value of the parking subsidy, either as a taxable cash commute allowance or as a mass transit or ridesharing subsidy. Offering the cash option to employees who now receive employer-paid parking would reduce their solo driving share by an estimated 20%, and the number of vehicle miles traveled (VMT) per employee by 17%. This VMT reduction would reduce the total cost of automobile commuting to downtown Los Angeles by \$40 million per year, and would save 3.5 million gallons of gasoline per year.

Managing Transportation Demand: Markets Versus Mandates

G. Giuliano and M. Wachs, September 1992, Reason Foundation, Report No. Policy Insight No. 148

Abstract: The increasing concern over congestion and air quality problems in Southern California, as well as recent federal legislation, has focused new attention on transportation demand management (TDM). The purpose of TDM is to reduce the demand for trips in order to cope with pollution problems and other difficulties associated with growth. There are two general approaches to TDM: a regulatory approach and a market-based approach. The regulatory approach, such as mandatory trip-reduction programs, involves requiring a class of individuals to achieve a specific performance target established by fiat, e.g. a particular average vehicle ridership. In contrast, a market-based policy creates incentives for socially desirable action but allows for discretionary market choices on the part of individuals. For example, the congestion pricing of expressways provides incentives for individuals to shift travel to non-peak times or to carpool, but it also allows individuals to pay premium fees if they so choose. This study compares the regulatory approach with the market-based approach, by focusing on a paradigm example of each. The South Coast Air Quality Management District's Regulation XV (a mandated employer-based trip-reduction program) is contrasted with the potential for congestion pricing on Southern California's freeways. The reduction in vehicle miles traveled (VMT) from congestion pricing is projected to be at least 12 times as great as that produced by Regulation XV. Even though regulatory techniques like Regulation XV are considered more politically acceptable, market-based strategies such as congestion pricing are more effective and more efficient, and should be considered the TDM policy tool of choice.

International and Municipal VMT Reduction Policies: Synthesis

prepared for

Anne Criss, Program Lead, Climate Change Team, WSDOT

prepared by

Aaron Poor, TRAC Synthesis Editor

Kathy Lindquist, WSDOT Research Office

Michel Wendt, WSDOT Library

July 16, 2008

Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WSDOT staff. Online and print sources may include newspaper and periodical articles, NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs and related academic and industry research. Internet hyperlinks in the TSRs are active at the time of publication, but host server changes can make them obsolete.

Request for Synthesis:

Anne Criss, Program Lead, Climate Change Team, WSDOT, requested a synthesis of VMT reduction policies, targets, and measures by cities in the US and cities and countries internationally.

Background:

Municipal and national programs to curb vehicle miles traveled (VMT) work variously. Alternative modes of travel are improved through increased pedestrian access or investing in transit infrastructure. Incentives function financially by taxing road use or offering cash in lieu of unused parking fees, or they may simply be advisory, educating the public on travel behavior. Urban growth and planning strategies encourage development near transit, seek public involvement, and generally build transportation-efficient cities.

Databases Searched:

- Transport, available through WSDOT Library
- TRIS Online
- Research in Progress
- Google
- Wisconsin DOT Transportation Synthesis Reports

Synthesis Summary:

Categories of publications and resources are as follows:

- Multimodal Programs
- Financial Mechanisms
- Growth and Planning
- Transit
- Ad Campaigns
- Resources

MULTIMODAL PROGRAMS:

Pedestrian Design Guidelines

Portland, Oregon, Office of Transportation, 1998

Seven design principles enhance the pedestrian environment by providing safety, accessibility, efficient transportation, and a pleasant atmosphere (p. 3 of Introduction):

- The pedestrian environment should be safe,
- The pedestrian network should be accessible to all,
- The pedestrian network should connect to places people want to go,
- The pedestrian environment should be easy to use,
- The pedestrian environment should provide good places,
- The pedestrian environment should be used for many things, and
- Pedestrian improvements should be economical.

<http://www.portlandonline.com/transportation/index.cfm?c=34955>

Employer Resources, Bike and Walk Benefits, Parking Cash Out

Downtown Minneapolis Transportation Management Organization

Employers that subsidize employee parking, transit pass, or vanpool costs, can extend this benefit to employees who bike or walk to work by allowing employees to take a "healthy choice" award in cash in lieu of the subsidy.

The value of the award will be subject to taxes. There is no real cost to employers. The amount is treated as additional compensation and employees incur payroll and income taxes. The employer will have to pay payroll taxes on the cash out benefit provided. To offset that cost, employers can simply lower the cash out amount by their share of the payroll taxes.

This "healthy choice" award allows employees to cover the costs of walking shoes, rollerblade and bicycle equipment and repair, bicycle locker rental, or shower privileges at a nearby gym.

http://www.mplstmo.org/pages/employer_bikewalk.html

Safe Routes to Schools

NYDOT

Transportation Commissioner Janette Sadik-Khan announced that 97% of the short term safety improvements at the 135 priority schools in the Safe Routes to Schools Initiative are complete. This work includes new traffic and pedestrian signals, the addition of exclusive pedestrian crossing time, speed bumps, speed boards, high visibility crosswalks and new parking regulations. DOT also announced that capital construction on long term improvements has begun. The next 135 public, private and parochial elementary and middle schools will be identified this winter as well as 40 high schools for similar safety enhancements.

<http://www.nyc.gov/html/dot/html/safety/saferoutes.shtml>

FINANCIAL MECHANISMS:

B.C.'s Revenue-Neutral Carbon Tax

Excerpt: On July 1, 2008, subject to approval by the legislature, British Columbia will begin to phase in a fully revenue-neutral carbon tax with built-in protection for lower income British Columbians.

The purpose of the carbon tax is to encourage individuals and businesses to make more environmentally responsible choices, reducing their use of fossil fuels and related emissions. The tax has the advantage of providing an incentive without favouring one way to reduce emissions over another. Business and individuals can choose to avoid it by reducing usage, increasing efficiency, changing fuels, adopting new technology or any combination of these approaches.

http://www.bcbudget.gov.bc.ca/2008/backgrounders/backgrounder_carbon_tax.htm

Road Pricing: Different payment for mobility

Dutch Ministry of Transport and Water Management

At the end of November 2007, the Dutch cabinet decided to introduce a road payment system based on a kilometre charge. The first road users will be confronted with the kilometre charge in 2011, with the entire system being operational by 2016. This site contains background information on the introduction of the kilometre charge.

Paying per kilometer:

In the near future you will pay for the use rather than the possession of a car. The road tax (MRB) and the vehicle purchase tax (BPM) will be phased out and road users will pay per kilometre driven. Motorists who use the car infrequently will pay less, whereas those who drive regularly will pay more. In addition, cars that cause more pollution will be more expensive than cleaner cars and driving in off-peak periods and on quiet roads will be cheaper than driving on busy roads in the rush hour. The revenue from the kilometre charge system will be paid directly into the infrastructure fund. This will be used to finance the construction, management and maintenance of roads, bridges and viaducts . . .

http://www.verkeerenwaterstaat.nl/english/topics/mobility_and_accessibility/roadpricing/index.aspx

Road Pricing Project Descriptions

FHWA Office of Policy and Governmental Affairs

This Web site provides case studies under the following headings:

- Converting HOV Lanes to HOT Lanes (Category A-1),
- Cordon Tolls (Category A-2),
- FAIR Lanes (Category A-3),
- New Priced Lanes (Category B),
- Pricing on Toll Facilities (Category C),
- Usage-Based Vehicle Charges (Category D-1),
- "Cash Out" Strategies (Category D-2), and
- Regional Pricing Initiatives.

<http://www.fhwa.dot.gov/policy/otps/projdesc.htm>

Congestion and variable user charging as an effective travel demand management instrument

D. Hensher and S.M. Puckett, August 2007, *Transportation Research Part A* 41(7): 615-626, ISSN: 0965-8564

Abstract: Interest at the political level in congestion charging is gaining pace as cities struggle with ways to reduce the effects of growing traffic congestion on the liveability of cities. Despite a long history of promotion of a wide array of travel demand management (TDM) initiatives, very few have had a noticeable impact on the levels of traffic on the road networks of metropolitan areas. TDM success in this context has almost become a band-aid in the absence of a pricing strategy that not only promotes efficient use of the system but also hypothecates revenues to support essential complementary infrastructure and services such as public transport. This paper takes a look at the stream of pricing consciousness that is surfacing around the world. Although very few jurisdictions have implemented congestion charging, or any form of efficient variable car and truck user charging, the winds of change are well in place. The adage "it is not a matter of if but of when" seems to be the prevailing view. Our overview of global trends in positioning the debate and hopefully follow-through commitment to implementation provides a backdrop to papers submitted for this special issue on travel demand management. The predominance of papers on pricing is indicative of the priority that must be given to efficient charging and revenue disbursement.

The road pricing proposal for Tokyo—its development and major issues

K. Ohta, 2001, *World Congress on Intelligent Transport Systems, 8th*, Sydney, New South Wales, Australia

Abstract. Road Pricing is a measure of traffic access restraint with economic incentive. Facing deteriorating traffic congestion and air pollution, TMG (Tokyo Metropolitan Government) has introduced several TDM (Transportation Demand Management) measures to reduce traffic volumes especially in the central area of Tokyo. Pollution by nitrogen oxides and particulates is of increasing concern and control of traffic and especially older diesel lorries is considered important. An outline of proposed road pricing schemes is outlined. It is planned to charge both cars and lorries. Charges are set to reduce traffic and improve air quality, but the lorry charge is reduced for economic reasons. A cordon pricing system is proposed from 0700 to 1900h on weekdays. A camera identification system is proposed. The effects and impacts of the road pricing scheme are simulated and the implementation of the scheme is discussed.

GROWTH AND PLANNING:

Portland Program Offers Incentives to People Who Buy Homes Near Transit

Smart Growth Online

Similar to other such measures across the nation, the new Portland Regional Smart Commute Initiative will let buyers of homes near transit obtain higher mortgage loans, or increase their purchase power by the prospective transportation savings -- \$200 per month for one-wage-earner households and \$250 for two-wage-earner households . . .

The initiative brought together Fannie Mae, Countrywide Home Loans, Portland Metro, TriMet, the Portland Development Commission, the city's Transportation Office, Flexcar, and the Portland Metropolitan Association of Realtors.

According to *The Business Journal of Portland*, the Smart Commute Initiative will provide home buyers with free one-month passes on TriMet buses and light-rail trains, while Flexcar will offer those who join its car-use program \$100 in initial credit . . .

<http://www.smartgrowth.org/news/article.asp?art=4342&State=38&res=1024>

Regional Funding Programs

Sacramento Area Council of Governments

SACOG has three federally funding programs that help local government agencies promote the goals of SACOG's Metropolitan Transportation Plan and Blueprint Project. SACOG solicits project applications from public agencies and their partners, proposing projects located in Sacramento, Sutter, Yolo, and Yuba counties. There are three transportation-related programs: Bicycle/Pedestrian, Air Quality and Community Design. All three programs have awarded projects in early 2006.

<http://www.sacog.org/regionalfunding/fundingprograms.cfm>

Introduction to Envision Utah

In January 1997, the Envision Utah Public/Private Partnership was formed to guide the development of a broadly and publicly supported Quality Growth Strategy - a vision to protect Utah's environment, economic strength, and quality of life for generations to come. Five years of scenarios analysis, research and public involvement have helped Envision Utah bring the topic of planning and preparing for growth to the forefront of the public mind. With the help of thousands of Utah residents, Envision Utah has developed a Quality Growth Strategy that will help preserve critical lands, promote water conservation and clean air, improve our region-wide transportation systems, and provide housing options for all residents.

<http://www.envisionutah.org/introduction.phtml>

Singapore's motorization policies 1960–2000

C. Willoughby, April 2001, *Transport Policy* 8(2): 125-139

Abstract. Because of the rapid economic growth it sustained over the last 40 years and the small physical space at its disposal, Singapore has had to give special attention to managing the process of motorization—the spread of private motor vehicle ownership and use. Despite the inevitable imperfections of the policies adopted—and, more seriously, of related land-use and resettlement policies—the motorization restraints had no major negative side-effect on economic growth and generated substantial funds for the improvement of social welfare.

TRANSIT:

Renaissance of Public Transport in the United States?

John Pucher, Winter 2002, *Transportation Quarterly* 56(1): 33–49

The article details New York's public transportation boom from 1995 to 2005, crediting improved fare policy, service, and security (p. 11 of PDF).

<http://www.vtpi.org/tqtransi.pdf>

Curitiba, Brazil: BRT Case Study

Curitiba's bus system was developed as an integral part of an overall master plan whose basic objectives included radial expansion of the city along five corridors (structural axes), integrating land use and transport, and protecting the traditional city center. The median busways in each corridor are in the center of a "trinary" road system (busway, local street, one-way arterial). Development densities are greatest within this system as compared with other parts of the city.

Curitiba's busways are viewed as a model bus rapid transit (BRT) system. They are widely recognized for their many innovative features. Trunk and feeder bus lines routed through terminals allow convenient fare-free transfer. Bi-articulated five-door buses and tube stations with off-vehicle fare collection and floor-level boarding facilitate passenger access. Finally, direct express service and tube stations are provided along parallel, one-way arterial streets.

The overall system is the result of many incremental decisions aimed at improving service quickly, pragmatically, and affordably.

http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp90v1_cs/Curitiba.pdf

The relationship between car ownership and public transport provision: as case study of Hong Kong

S. Cullinane, January 2002, *Transport Policy* 9(1): 29-39

Abstract. It is often suggested that traffic demand management measures designed to make public transport more attractive have little impact on car ownership and use. Much of the work on this subject, however, relates to piecemeal changes in public transport provision. Results of an attitudinal survey of 389 university students in Hong Kong, where public transport is both plentiful and cheap and car ownership and use is extremely low, indicate that good public transport can deter car ownership, with 65% of respondents stating that they are unlikely to buy a car in the next 5 years.

AD CAMPAIGNS:

Travel Feedback Programs: Communicative Mobility Management Measures for Changing Travel Behavior

Satoshi Fujii and Ayako Taniguchi, 2005, *Proceedings of the Eastern Asia Society for Transportation Studies* 5: 2320-2329

Abstract. This paper reviews the literature on travel feedback programs (TFPs). These constitute soft measures, involving psychological and behavioral strategies, designed to change travel behavior, mainly, from automobile to a non-automobile travel, in Mobility Management (MM). We classified TFPs according to place, technique, procedure, and communication media. Then, we reviewed the effectiveness of ten TFPs implemented in Japan. We found that the TFPs in Japan reduced CO2 emissions by about 19%, and car use by about 12%, while increasing the use of public transport by about 50%. The size of these

effects did not differ much from those observed in Western countries including European countries and Australia. In addition, we found that TFP's effectiveness increased when participants were asked to make behavioral plans to change their travel behavior.

Travelling smarter down under: policies for voluntary travel behaviour change in Australia

Michael A.P. Taylor and Elizabeth S. Ampt, July 2003, *Transport Policy* 10(3): 165-177

Abstract: This paper reviews the voluntary travel behaviour change programs adopted across Australia in recent times. These programs facilitate individuals and households in changing their travel behaviour through personal choice and individual action. The paper examines the issues relating to the various programs and discusses the techniques used and the results and evaluations. The behaviour change programs reported to date show consistent evidence that participating households make substantial reductions in their usage of private motor vehicles. Further, a range of non-transport benefits have been found, albeit at the local level. These benefits include changes in land use, social interaction, economic development, and health indicators. One consequence is that other government agencies, responsible for areas such as community development, health, environment, energy, public safety, planning and even education, have begun to form interests in the programs. Two key challenges have emerged: (1) the actual measurement tools are hard to implement or the changes are on a scale smaller than that at which measurement is usually made, and (2) the clients for travel behaviour change programs have to date been transport organisations for who the only relevant outcome is travel change. Given that these projects may be of value to other interested organisations, it may be that ultimately travel behaviour change may be intimately linked with all aspects of community life, which could lead to greater change, and certainly to greater sustainability.

Designing a procedure to undertake long term evaluation of the effects of TravelSmart interventions

P. Stopher, S. Greaves, M. Xu, and N. Lauer, 2005, *Australasian Transport Research Forum (ATRF)* 28, Report No. 1877040428

Abstract: As part of the program of strategies to reduce the emission of greenhouse gases in Australia, the ACT, Queensland, South Australia, and Victoria have joined together to undertake a program of voluntary travel behaviour change (VTBC) strategies. Based on implementation of such strategies in a few locations around Australia, estimates have been made of the potential reductions in greenhouse gases that might be achievable. The intent of the project undertaken by the Institute of Transport and Logistics Studies (ITLS) was to develop a method for long-term monitoring that would indicate the probable extent of reductions of greenhouse gas emissions through measuring the reduction in vehicle kilometres of travel (VKT).

RESOURCES:

Climate Change 2007: Mitigation, Transport and its infrastructure

S. Kahn Ribeiro, S. Kobayashi, M. Beuthe, J. Gasca, D. Greene, D.S. Lee, Y. Muromachi, P.J. Newton, S. Plotkin, D. Sperling, R. Wit, and P.J. Zhou, 2007, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

Discussion of VMT reduction policy begins on page 26 of the PDF with attention to modal shifts from personal vehicles to public and non-motorized transportation. Detailed discussion of mitigation policies and measures for surface transportation begins on page 44 of the PDF, covering:

- Land use and transport planning,
- Taxation and pricing,
- Regulatory and operational measures,
- Fuel economy standards, and
- Transport Demand Management.

<http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter5.pdf>

Policies in Key Countries

Pew Center on Global Climate Change

http://www.pewclimate.org/policy_center/international_policy

Trends in vehicle kilometres of travel in world cities, 1960–1990: underlying drivers and policy responses

I. Cameron, T.J. Lyons, and J.R. Kenworthy, July 2004, *Transport Policy* 11(3): 287-298

Abstract: Increases in private motorised urban vehicle kilometres of travel are shown to arise from population growth, urban sprawl, increased car ownership and decreases in vehicle occupancy. In particular, the worldwide increase in urban mobility since 1960 has been the direct result of increased affluence and the consequent greater accessibility of private motor vehicles, as well as population growth. Urban sprawl has significantly less influence, although it has been significant in USA, Canadian and Australian cities. Despite this, a number of cities have shown that clear policy initiatives can contain the growth of urban private motorised mobility.

Greenhouse Policy Options for Transport

Bureau of Transport and Regional Economics, 2002, ISSN: 1446-9790, Report No.'s 1877081094 and Report 105

Abstract: This report explores the actions involving the transportation industry that have the potential to decrease greenhouse gas emissions in Australia. The report includes the economic, fiscal, and environmental impacts. Since road transportation accounts for about 14% of Australia's total greenhouse emissions, it is the main focus of the report. (Australia generates less than 2% of the greenhouse gas emissions in the world). The table of contents lists the following chapter and subject headings. Chapter 1 Greenhouse Gas Emissions And The Australian Transport Sector—Kyoto origins and outcomes, The transport sector and greenhouse emissions; Chapter 2 Reducing Vehicle Kilometres Traveled (VKT)—Induced travel, Public transport, Personalized journey planning techniques, Ridesharing, High occupancy vehicle (HOV) lanes, Parking, Park and ride, Non-motorized transport, Carsharing, Car-free days, Flexible work arrangements, Increased urban density, Shifting freight from road to rail; Chapter 3 Reducing Emissions per VKT—Mandated fuel efficiency standards, Feebates, Promoting technological improvements, Inspection and maintenance programs, Voluntary agreements with manufacturers, Education and provision of information, Encouraging the use of alternative fuels, Modernizing the vehicle fleet: accelerated scrapping of older cars, Intelligent transport systems; Chapter 4 Road-Use Charges—The case for road-use charges, Environmental impact of road-use charges, Efficiency impact of road-use charges, Fiscal impact of road-use charges; Chapter 5 Economy-Wide Measures—Carbon taxes, Tradable permits; Chapter 6—Choosing the Best Policies - Win-win measures, Economy-wide measures, Targeted measures, Integrated strategies.

Appendix 5 – VMT Best Practices – Current Projects



King County Metro Transit

Public Transportation Services

What is the program?

Other Programs to Reduce SOV and VMT

King County Metro implements a wide array of programs to make our public transportation and ridesharing services, as well as non-motorized travel, more attractive to travelers. The programs address both the commute and non-commute markets.

What are we doing now?

Commuter Market

Metro's programs have focused primarily on the employers affected by the state Commute Trip Reduction (CTR) program. The ability to reach non-CTR affected employers via the Growth and Transportation Efficiency Center program is a step in the right direction to engage more employers. Metro has over 2000 employer customers for the following programs:

- Transit Passes (PugetPass, FlexPass, Soon ORCA smart card)
- Home Free Guarantee (emergency ride home)
- Commuter Bonus (Vouchers for transit and vanpool fares on many transit agencies)
- Commuter Bonus Plus (Vouchers to provide subsidies to employees who carpool, bike, walk or telework)
- Carsharing (in partnership with Zipcar, reduced the need for commuters to have a car at work for mid day trips)
- Promotions to employers and commuters
- Numerous partnerships with cities, business groups, and employers

Non-Commute Market

King County Metro has created several programs to reduce SOV travel for non-work trips. Several cities, counties, and transit agencies have done the same. All have been pretty successful. Since non-commute trips represent such a huge proportion of all trips, any state program to implement 2815 must direct resources to this market segment. A critical place to start in this would be to better understand what non-commute trips are taken by individuals and why. Recent PSRC survey data suggests that this is the right place to start.

In Motion

The In Motion program was designed to help individuals leave their cars at home — some of the time. It was built using the foundations of community-based social marketing: speaking to the motivations of local communities by providing information, getting action commitments, and offering prompts and incentives to encourage new, healthier travel behavior.

Average results for In Motion programs:

- participation rates between 8% and 10% of the households contacted
- reported changes of 20% fewer drive-alone trips
- corresponding increases in busing, biking, ridesharing and walking
- increased openness to using alternative modes more often.



Community-Based Marketing Reduces SOV

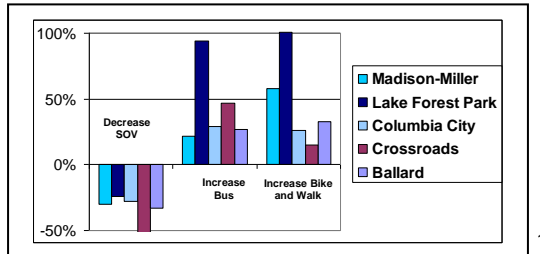


Figure 1. Change in travel behavior in *In-Motion* neighborhoods

Partners In Transit

The Partners in Transit program is a new way for Metro to work with organizations that share our commitment to sustainable living. Partners in Transit brings a membership organization's customers the information they need to explore how they can get around their community while leaving their car behind. The program is geared to helping individuals think about every trip they make, and finding the ones that are easy to change from driving to taking the bus, walking, biking or sharing a ride.

Partners in Transit promotes healthy transportation through communications with partner members, shoppers, and/or affiliates. The Partners provide information and incentives to encourage the use of sustainable transportation as well as touching individuals through more traditional advertising and promotion.

Mileage Based Insurance

Over the next five years, King County and Unigard Insurance Company of Bellevue will be enrolling participants in a mileage-based insurance pilot. In a mileage-based program, drivers who reduce their miles driven qualify for lower insurance premiums. As people drive fewer miles to save on insurance, they will utilize more efficient travel options, reduce emissions and save energy. The pilot will aid in the creation of an insurance program that saves consumers money and it will also contribute to the nation's goal of establishing energy independence and reducing the production of greenhouse gasses. The demonstration will hopefully lead to acceptance of the pricing model by the Washington State Insurance Commissioner's Office for application statewide.

How does the program help reduce VMT?

For both the commuter and non-commute markets these programs, and others, influence the individual's decision about how to meet their mobility needs. They increase the attractiveness of riding the bus, ridesharing, biking, and walking.

¹ In Motion Program Data, survey of participants



What can we be doing with existing resources?

Transit agencies need to focus on promoting existing services and engaging local partners to help commuters and residents understand how to use their systems.

The level of effort in Washington State for the areas of public transportation, ridesharing and TDM stand head and shoulders above other states. Through statewide and national associations (WSTA, WSRO, APTA, and ACT), transit agencies and others should use that experience to affect state and national transportation policy.

What could we be doing with additional resources?

A significant expansion of programs to support both the commuter and non-commute travel markets is needed. Agencies and local jurisdictions need resources for promoting the availability and viability of alternatives, taking the CTR and GTEC programs to a much broader scale, and engaging a very large number of residents statewide in exploring and using travel modes that reduce VMT while enjoying the ability to meet their daily needs.



King County Metro Transit

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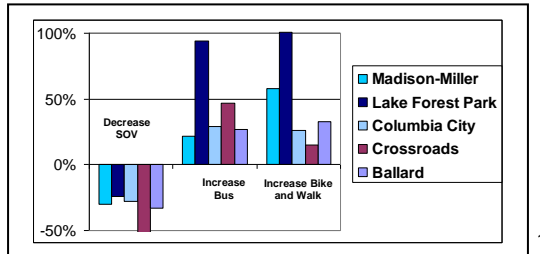


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King County Metro Transit

Ridesharing Services

What is the program?

King County Metro operates three lines of business to support ridesharing: Vanpool, Vanshare, and the statewide ridematching service, RideshareOnline.com.

Vanpool

Metro operates the oldest and largest public commuter van program in the nation. VanPool has been a guiding resource for other vanpool programs around the country. VanPool provides the van and everything else for successful ridesharing: rider support services, maintenance, insurance, fuel, tires and training. Groups of five to fifteen people all over the Puget Sound region are choosing to vanpool. Metro currently has over 980 vans on the road and several dozen in formation.

Vanshare

Vanshare is an innovative program that uses vanpool vehicles due for retirement from the fleet and puts them back into service to help commuters solve the “last mile” problem. Vanshare serves many Sounder commuter rail stations, connecting Sound Transit riders to their workplace where no similar connection existed before. Likewise, many Washington State Ferries customers complete their commute in a Vanshare vehicle. There are currently over 180 Vanshares on the road.

RideshareOnline.com

Thousands of people all over the state use RideshareOnline.com to find their carpool, Vanpool, or Vanshare partners. See below for more information.

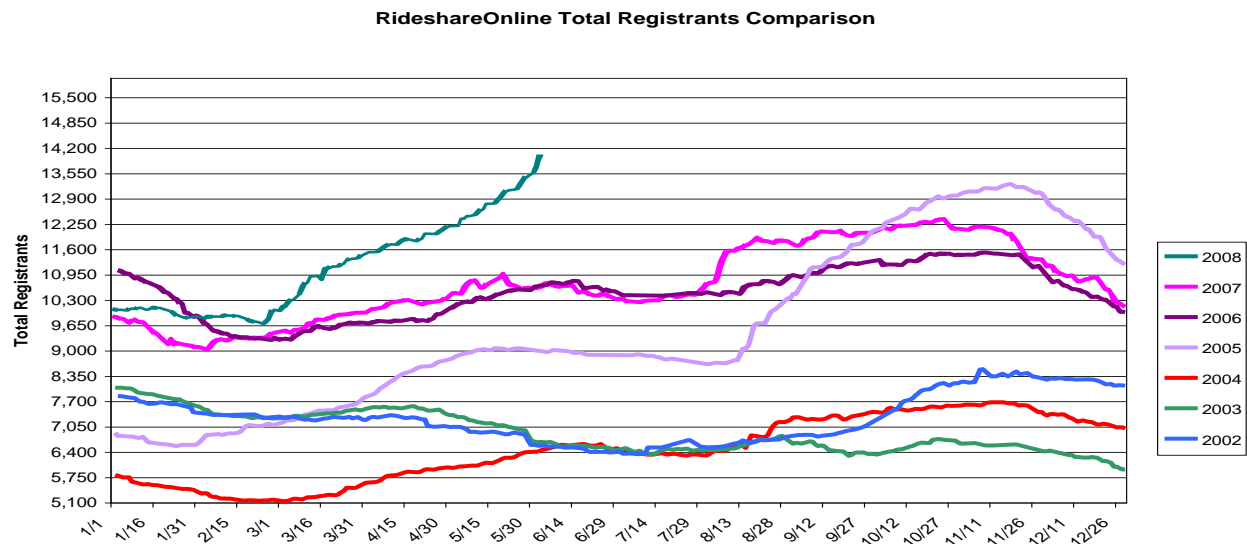
How does the program help reduce VMT?

Ridesharing increases average vehicle occupancy (AVO). As AVO rises, a single vehicle accomplished the travel need for more people, taking cars off the road. This leads to reductions in VMT. Furthermore, ridesharing meet travelers’ mobility needs in many context where public transportation cannot due to high costs.



What's happening now?

As with transit use statewide, ridematching is increasing due to rising fuel costs. The chart below tracks RideshareOnline.com registrations over time.



Over eighty percent of RideshareOnline registrants live and work in the Central Puget Sound region.

In terms of GHG emissions reductions, the Vanpool program has been very successful. While not expressed in terms of VMT, consider the impacts of the Vanpool program:

- Saved 21,000 Tons of GHG from being produced.
- Saved 2,150,000 of equivalent gallons of fossil fuel from being consumed.
- Experienced a 70% reduction in all regulated emission categories.
- Saved our citizens \$7,800,000 in vehicle fuel and maintenance costs.

What can we be doing with existing resources?

Demand for vanpools is way up. Rideshare Operations is receiving a record number of driver applications. There has been a 16% increase over the same period in 2007. Metro has added an extra Saturday orientation class in June to accommodate 30+ volunteer vanpool drivers and adding two additional Saturday classes next quarter. Presently Metro has 15 new vanpool groups scheduled to start with another 16 new vanpool groups in formation, for a total of 31 new vanpool starts scheduled for June already. The VanShare program has four groups starting from King Street station now that additional parking has been arranged and one vanshare being formed.

The IWG should prioritize promotion of carpooling and vanpooling as the motorized modes that can do the most to reduce VMT in the short term at the lowest cost.



What could we be doing with additional resources?

The Washington State Ridesharing Organization (WSRO) developed the following list of priority investments for 2007-2008. This list is being updated in collaboration with the state Commute Trip Reduction Board and the Washington State Transit Association. The priority projects are:

- Purchase additional expansion vans to meet customer demand based on priority criteria. \$10 - \$12 million.
- Establish a statewide customer loyalty program with an “incentive registration” and “calendar tracking system.” linked to RideshareOnline.com while maintaining individual program branding. \$1.25 million.
- Identify and install roadside signage for RideshareOnline statewide. \$500,000.
- Incentive tracking and calendar registration established on one central database connected to RideshareOnline. \$250,000.

This list will change as the 2009 legislative strategy is developed, but indicates where new resources can lead to success in reducing VMT.



King County

Department of Transportation
Metro Transit Division

King County Department of Transportation

Transit Oriented Development

What is the program?

The King County Council funded the Transit Oriented Development (TOD) program in 1998 to support its Urban Center vision. The program was directed to work with Urban Center jurisdictions to develop transit supportive land uses and activities. TOD staff operates within the DOT Director's office to facilitate transit supportive housing and retail joint-development at selected Transit Division properties.

One major goal of the program is to increase transit ridership through co-locating housing, jobs, and shopping with close proximity for walking or transit. A related goal is to identify opportunities to introduce an element of affordability into the development of housing near the transit centers.

How does the program help reduce VMT?

Increasing density of housing, jobs, and shopping uses in close proximity to transit and pedestrian opportunities reduces the need to use single occupancy vehicles. Also, fewer parking stalls are necessary for multi-family housing constructed close to transit. At the Overlake TOD, car ownership is .6 per unit; much lower than comparable projects. At the Renton TOD, 38% of the residents are using the bus an average of 7 times per week.

What's happening now?

Demand for multi family, affordable housing remains strong, especially rental, in the current economic climate. Population growth remains strong in the region despite the current credit restricted downturn. Developers continue to search for properties to construct lower to middle income rental units with convenient pedestrian or transit availability.

The TOD program has consistently emphasized higher density housing with minimum parking availability and maximum transit and pedestrian access. This emphasis makes the Transit properties being evaluated for TOD development even more valuable since the recent upswing in fuel prices.

What can we be doing with existing resources?

The TOD program currently receives grants and annual council appropriations to conduct feasibility studies and other pre-development work on selected Transit Division properties suitable for joint-development.

Since there is no additional funding for developable Transit properties whose land values cannot support the cost of structuring the existing parking, TOD is limited to properties with higher land values or where more affordable housing can be incorporated. For example, low income housing tax credits can reduce the cost of borrowing for a developer able to build at the lower end of the affordable housing spectrum.



King County

Department of Transportation
Metro Transit Division

What could we be doing with additional resources?

Capital improvements could be made at existing park and ride lots on highly travelled corridors to increase and reorient surface capacity into structured parking while also providing a podium upon which to build multi-family housing. The resulting increased housing and park and ride density would increase the utility of existing Transit properties and advance Urban Center goals to reduce VMT and green house gas emissions.

Program Title: Climate Protection Program

What is the program? This program includes several projects aimed at reducing VMT. These include:

1. *Land Use and Air Quality Analysis:* The goal of this project is to identify key land use characteristics that result in lower VMT. We are working with academic researcher Dr. Larry Frank to identify land use characteristics (referred to as urban form) that would help reduce GHG emissions and meet the Governor's and the Legislatures greenhouse gas reduction goals. This work builds on the existing research demonstrating that local amenities, increased density, street connections, and access to transit.

Preliminary results show that we can explain about 30 to 35% of the variation in VMT with changes in density, retail space, land use mix (civic, education uses, entertainment, retail, office etc.), number of intersections, and auto ownership.

2. *Assessing GHGs from SR-520 Improvement Project:* This project calculates the GHGs associated with the proposed SR-520 Bridge Improvement project, focusing on the three options (bridge, tunnel, and changing on-ramps). We are evaluating how different levels of transit service and other amenities affect bridge traffic and air emissions. This project is part of the Health Impacts Assessment as required under ESSB 6099.¹
3. *GHG Emissions Inventory Assistance to Local Jurisdictions:* We are working with ICLEI, an international non-profit that has developed emissions inventory software for local jurisdictions to calculate their GHG emissions. We are developing a regional guidance document for Puget Sound local jurisdictions to use the software. In addition, we're gathering data necessary to run the software, including VMT estimates from PSRC, and will post them in a data repository on our website. This will allow small jurisdictions with limited resources to easily calculate their GHG emissions.

How does the program help reduce VMT?

1. The land use and air quality project will provide land use characteristics that could be used as community development goals. For example, if we find that certain intersection densities and number of retail or amenities are associated with reduced VMT, we could offer these up as goals for developing communities or include them as development requirements for state or regional funding, particularly since they will be based on the Governor's and State Legislature's

¹ An act relating to the state route number 520 bridge replacement and HOV project, signed May 2007.

goals. We can also ask our researcher to identify land use characteristic goals that will meet the VMT goals stated in ESHB 2815.

2. The GHG emission estimates from the SR-520 project will be shared with the stakeholder advisory committee that is evaluating the three options. We have included a number of assumptions about transit levels and land use in an effort to demonstrate the impact of these services on GHG emissions.
3. The local guidance document and data repository will assist jurisdictions in estimating their GHG emissions. More specifically, we are working with PSRC to generate the VMT estimates that locals would use in their inventories. Key assumptions about how these numbers are generated have a dramatic effect on the VMT estimates and how jurisdictions view their responsibilities in implementing strategies aimed at reducing VMT.

What is happening now (current status/activities)? We expect a draft final guidance document from ICLEI and a final report from Dr. Frank at the end of June. We expect to obtain VMT estimates for our local jurisdictions by early fall and to create the repository by early 2009. We expect to finalize our GHG estimates for the SR-520 replacement project by August 2008.

What can we be doing with existing resources to enhance the program's ability to reduce VMT? We expect local jurisdictions to need assistance in developing strategies to reduce their VMT. This includes increased transit service and advanced community development.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)? As our jurisdictions become more aware of their impact on VMT, we will need to provide services and assistance to help reduce their overall emissions, particularly as they pertain to transportation.

Program Contact: Leslie Stanton
Program Manager: Leslie Stanton
Program Manager Title: Team Lead, Climate Protection and Transportation Planning Unit
Agency number: 206-689-4022
Program manager email: leslies@pscleanair.org
Program web page: www.pscleanair.org



Mass transit expansion proposal

On November 4, 2008, residents will decide whether to expand mass transit in the Central Puget Sound region. The Sound Transit 2 Plan responds to immediate demand for transit expansions by delivering a 17 percent increase in express bus service in 2009. It achieves a 53-mile regional light rail system, five years sooner than earlier proposed. The plan responds to the more than 15,000 public comments Sound Transit received this year and gets ready for the region’s projected population increase of 1.2 million by 2030.

LINK LIGHT RAIL

Adds 34 miles of light rail to the Link system that opens for service between downtown Seattle and the airport in 2009 and to the University of Washington in 2016:

- North from the University of Washington to Northgate, Shoreline and Lynnwood
- East from downtown Seattle across Interstate 90 to Mercer Island, Bellevue, Overlake Hospital and Redmond’s Overlake Transit Center
- South from Sea-Tac Airport to Highline Community College and Federal Way at South 272nd Street
- Link connector service serving Seattle’s International District, First Hill and Capitol Hill.

Expands light rail with a partnership to extend Tacoma Link beyond the downtown area.

SOUNDER COMMUTER RAIL

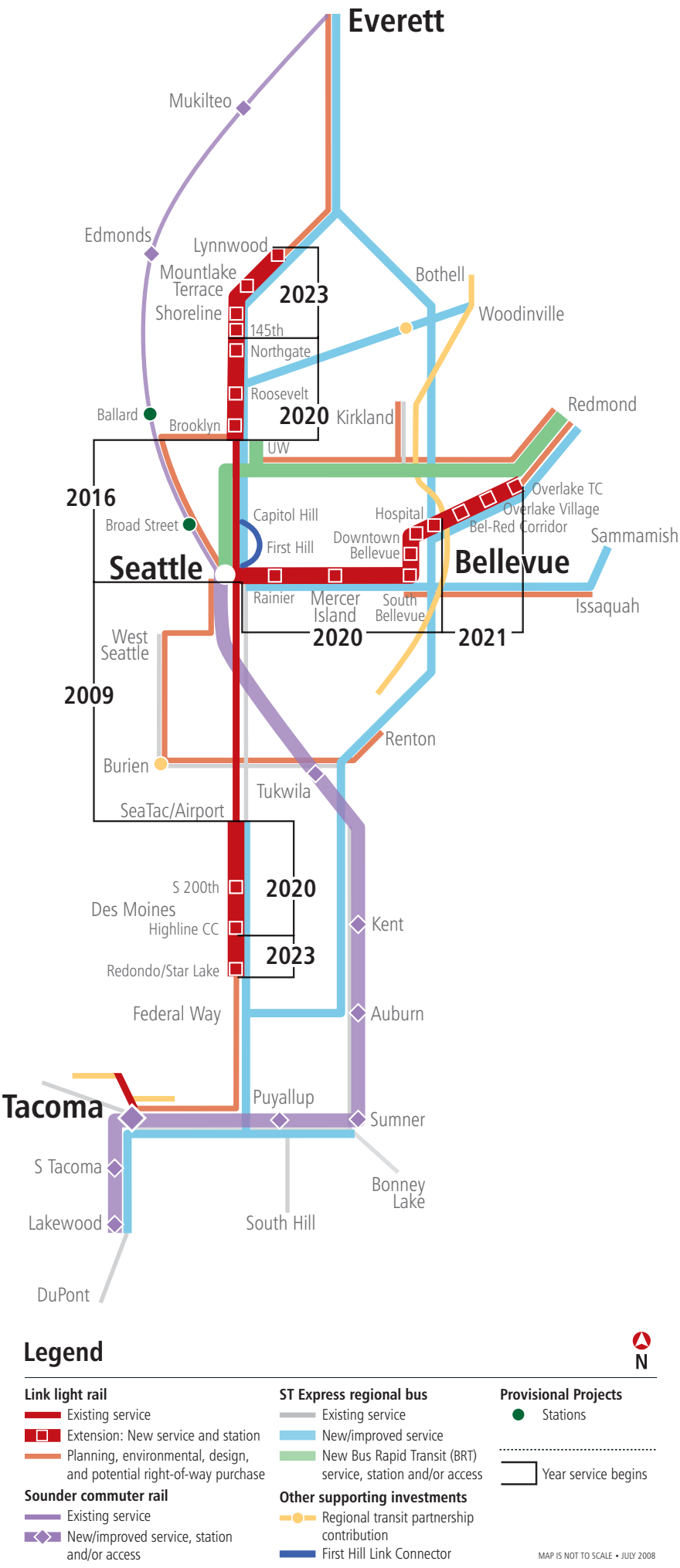
Increases Tacoma-Seattle Sounder commuter rail service by adding four new daily round trips and by increasing platform lengths to accommodate longer trains. This increases passenger capacity by 65 percent to meet strong rider demand in the corridor, providing reliable and congestion-free travel as population growth continues to worsen roadway congestion. Includes two provisional rail stations at Broad Street and Ballard that can be implemented subject to the availability of additional funds.

Contingent upon negotiations with BNSF Railway.

ST EXPRESS REGIONAL BUSES

Expands regional express bus routes serving the region’s busiest housing and job corridors; more buses will be in service quickly to provide near-term relief while capital projects are under construction. ST Express buses operate from early morning to late at night, traveling on existing freeway HOV lanes. The draft plan boosts service with:

- Rapid delivery of expanded ST Express service, with an increase of 17 percent in 2009
- Service increases of 10 to 30 percent in key corridors, with reinvestment of existing services as rail services come on line
- Expands Sound Transit’s bus fleet by 25 percent
- New Bus Rapid Transit service on SR 520 to coincide with bridge replacement and tolling.



LINK LIGHT RAIL FEATURES

In addition to extending the Central Link light rail line with 34 miles of new light rail, the package supports moving forward rapidly with further extensions to Tacoma and Redmond in a future phase by funding environmental review, preliminary engineering and early right-of-way purchases. The package also includes planning for a future extension to Everett.

Fast, frequent service

Environmentally friendly electric light rail trains operate in their own right-of-way, providing fast, reliable service that isn’t delayed by congestion. Trains will run 20 hours per day and every few minutes during rush hours.

Ample room to grow

System capacity can be expanded to meet long-term needs from continued population growth by running trains as often as every four minutes with up to four cars, each train carrying up to 800 riders, for an hourly capacity of up to 12,000 riders in each direction. Stations will act as hubs where riders transfer from buses onto congestion-free light rail service. Per passenger, light rail systems are on average 37 percent less expensive to operate than buses.

Sample light rail travel times	
Microsoft to downtown Bellevue:	11 min.
Northgate to downtown Seattle:	15 min.
Bellevue to Qwest Field:	20 min.
Lynnwood to UW:	21 min.
Lynnwood to downtown Seattle:	28 min.
Highline C.C. to Safeco Field:	37 min.

IMPROVED STATION ACCESS

Provides funds that will allow more people to access regional transit services at key locations. Access improvements in Auburn, Edmonds, Kent, Lakewood, Mukilteo, Puyallup, South Tacoma, Sumner, Tacoma and Tukwila will be tailored to the needs of each location and may include:

- Expanded parking
- Pedestrian improvements at or near stations
- Additional bus/transfer facilities for improved feeder service to stations
- Bicycle access and storage at stations
- New and expanded drop-off areas to encourage ridesharing.

EASTSIDE RAIL PASSENGER PARTNERSHIP

Provides funds for a potential capital contribution to a partnership for Eastside passenger rail operation on freight right-of-way there. Sound Transit and the Puget Sound Regional Council are currently evaluating the potential benefits of passenger rail operation on this corridor.

PARTNERSHIP PROJECTS TO IMPROVE MOBILITY

Contributes funds to complete projects in conjunction with other parties that will improve access to transit and travel times:

- Tacoma Link extension
- Bothell transit center/parking garage
- Burien parking garage.

RESPONDING TO REGIONAL GROWTH

Continued growth in the region’s population and employment puts increasing pressure on our

transportation system. The draft plan responds with targeted investments that provide new and expanded transit options to improve near-term and future mobility for people who live and work here. In 2030, 70 percent of the residents and 85 percent of the jobs in the Sound Transit District will be within easy access to light rail or commuter rail, either on foot or via a transfer-free bus ride.

Estimated growth by 2030	Population	Employment
Bellevue	+24%	+39%
Burien/Tukwila/Renton	+16%	+34%
Capitol Hill/Queen Anne	+20%	+23%
Downtown Seattle	+79%	+24%
Everett	+25%	+38%
Federal Way/Auburn	+17%	+33%
Kent	+35%	+30%
Lynnwood/Edmonds	+34%	+50%
North Seattle	+13%	+29%
Redmond/Kirkland	+26%	+40%
South Seattle	+7%	+29%
Tacoma	+18%	+28%

[Summary Needs Assessment, Parsons Brinckerhoff for Sound Transit, January 2008]

PROTECTING OUR ENVIRONMENT

With transportation the region’s largest contributor to greenhouse gas emissions, one of the most important things people can do to reduce their carbon footprints is to use public transit. This package would bring about 147,000 more daily riders to regional transit services in 2030, increasing ridership by more than 20% over what it would be without transit system expansion. It would reduce greenhouse gas emissions by 99,550 metric tons of CO2 equivalents per year.

RIDERSHIP

This draft plan takes thousands more cars off roads, with expanded train and bus services moving people through the region’s most congested corridors.

2030 Estimated Daily Ridership

Service	Without Plan	With Plan
Link light rail	124,000	286,000
ST Express buses	52,000	48,000
Sounder commuter rail	19,000	24,000
Total	195,000	358,000

Figures reflect near-term demand. Actual long-term system capacity will be much higher. Figures are preliminary and subject to refinement.

PLANNING FOR THE FUTURE

Funds several studies of future expansions: extensions of light rail from Lynnwood to Everett, UW to Ballard, Ballard to downtown Seattle, West Seattle and Burien, and Burien to Renton; and future high capacity transit services to Issaquah via I-90, along the I-405 corridor, and from UW across SR 520 to Redmond.

PAYING FOR EXPANDED SERVICES

- 5/10 of one percent sales tax increase, or five cents for every \$10 retail purchase
- Typical new cost per adult is \$69 annually
- Continuation of existing *Sound Move* taxes (0.4% sales tax and 0.3% vehicle license tax)

COSTS	2007 dollars	Year of expenditure*
Capital costs	\$9.1 billion	\$13.5 billion
Operating & maintenance (2008-2023)	\$1.2 billion	\$1.8 billion

Cost estimates as of 7/21/08, subject to revision.
*includes inflation



What is the program?

Sound Transit is the regional high capacity transit authority for the Central Puget Sound. Since 1993, the agency has been implementing a package of voter-approved high capacity transit investments to connect urban centers around the region, improve the speed and reliability of transit, and provide supporting capital infrastructure. The Sound Transit district serves the state's most populous area with nearly 3 million people – about 40% of the state's population.

Sound Transit operates long-haul, express bus service; commuter rail; and electric light rail. The agency has made significant capital investments in the State's HOV system, the BNSF freight rail corridor, transit centers, park-and-ride lots, and bike and pedestrian improvements. Sound Transit services and capital investments add significant transit capacity to the region, improve connectivity and reliability of transit and HOV travel, and greatly reduce vehicle miles traveled.

How does the program help reduce vehicle miles traveled (VMT)?

Sound Transit's entire regional high capacity transit system provides alternatives to single-occupant vehicle travel, increases customer access to transit services, promotes and enhances dense, livable communities, and improves speed and reliability of transit and HOV travel. Sound Transit provides 55,000 rides daily, thereby reducing VMTs and GHG by taking approximately 20,000 cars off the region's most congested roads daily. Major program elements include:

Regional express bus: Long-haul express bus service connecting major urban and employment centers. ST service and marketing is coordinated and integrated with other transit services and the State ferry system.

Capital connections: Major investments in the State HOV system, park-and-ride lots, transit centers, and bike and pedestrian transit access improvements. To date, ST has built ten HOV direct access ramps that improve the performance of the HOV system, built more than 10,000 parking stalls, and added 19 park-and-rides and transit centers around the region.

Commuter rail: Sounder commuter rail trains operate during peak periods on the BNSF freight rail corridor between Tacoma and Seattle (6 daily roundtrips) and between Everett and Seattle (3 daily roundtrips). Sounder uses ultra-low sulfur diesel fuel, and Sound Transit is in the process of implementing idle-minimization systems that have the potential to reduce fuel consumption by 34%. ST has invested more than \$1 billion to improve the track and signal capacity in this 82-mile BNSF corridor, which also is shared by Amtrak, and to improve commuter access to the rail service. ST also runs special event service.

Electric light rail: Light rail service in the congested I-5 corridor between the Airport and downtown Seattle is expected to carry 45,000 riders each day by 2020, with service starting in 2009. Construction will start on the extension to Husky Stadium this year, and by 2030, this regional high capacity spine will carry 114,000 riders a day. In Tacoma, daily ridership on Tacoma Link is almost 3,000. Electric light rail has virtually zero emissions, reduces VMT, is unparalleled in contributing to transit-oriented communities, and has the greatest people-carrying capacity of any transit alternative.

What is happening now (current status/activities)?

Sound Transit currently provides 55,000 rides a day on regional bus and rail services. Here is a sampling of additional transit projects and services coming on line this summer and fall:

- I-90 corridor: Issaquah Transit Center will open, adding more bus bays more than 800 parking stalls; served by KCM and ST.
- I-90 bridge: new HOV lane and direct access ramp will open.
- I-5 corridor: South Everett Freeway Station will open this fall.
- Pierce County: Lakewood Station will open this fall. This transit center and parking facility will be served by Pierce Transit and ST, and will provide a future Sounder commuter rail connection.
- Commuter rail: This fall, ST will add two round trip commuter trains between Tacoma and Seattle, and one round trip between Everett and Seattle. The agency just opened a station in Mukilteo, providing an important connection for ferry riders.
- I-5 corridor: Construction of the electric light rail spine from downtown Seattle to the Airport is nearing completion and will be operation in 2009. Construction on the extension to Husky Stadium will start this year.

What can we do with existing resources to enhance the program's ability to reduce VMT?

ST's ridership continues to grow as we add service and facilities with existing resources, so additional VMT reductions will materialize, particularly when light rail comes on line in 2009. As the region prepares for the start of that service, Sound Transit is working with other transit providers and major employers and institutions to build greater awareness of transit options, increase ridership, and make the transit system easy for customers to access.

What could we do with additional resources to reduce VMT?

Sound Transit will have a mass transit expansion plan on the ballot this fall. The Sound Transit 2 plan is a 15-year investment package, with projects and services being implemented incrementally. The plan is financed through a combination of existing taxes and an increase in the sales tax of 5/10 of one percent.

ST2 will extend light rail to Redmond, Redondo/Star Lake near Federal Way, and Lynnwood; increase commuter rail and regional express bus service; and improve access and connections to transit services. The plan balances near-term improvements to regional mobility through more bus and commuter rail service with longer-term investments in light rail. ST2 will:

- Reduces vehicle miles traveled by 268,000,000 annually
- Saves between 8,700,000 gallons of fossil fuel annually
- Reduces 99,550 metric tons of CO2 equivalents per year
- Makes transit system accessible to 70% of the residential population in the region and 85 % of the employment population
- Connects more regional employment centers with exclusive right of way transit

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Summary of WSDOT's Urban Programs

This briefing packet contains information about some of WSDOT's statewide demand management programs. The briefing is intended to provide an overview of these programs and how they support the state's vehicle miles traveled reduction goals.

All of these programs will continue to evolve based on experience and the state's goals for reducing congestion, energy use, and greenhouse gas emissions. Through several of these programs, local governments, regions and the state have set goals to reduce vehicle miles traveled (VMT) per employee, and while these efforts are limited in scope, they can provide a foundation for broader initiatives.

How does the program help reduce VMT?

On February 7, 2007, Governor Gregoire issued Executive Order 07-02, which set targets for the state of Washington to reduce emissions of greenhouse gases to 1990 levels by the year 2020, and to 50 percent below 1990 levels by 2050. Currently, vehicle usage produces 47 percent of the state's emissions, with on-road transportation producing more than 72 percent of vehicle usage emissions¹. It will be difficult to reduce emissions of greenhouse gases from transportation enough to meet the executive order targets without also reducing transportation demand. This is still true, even with recent federal legislation to improve vehicle fuel efficiency, and with aggressive development and use of biofuels.

The CTR program contributes to emission reductions and has an effect on total transportation demand. Commute trips by employees who work at CTR worksites account for 4.6 percent of statewide VMT. Even if all of the employees at CTR worksites switched to "zero emission" modes -- walking, bicycling, or teleworking -- statewide VMT and its associated greenhouse gas emissions would only decrease by 4.6 percent. This is because employees who work at these sites are only about 20 percent of total state employment, and because commuting accounts for between 18 and 33 percent of individual and household VMT. The addition of GTECs to the CTR program, via the CTR Efficiency Act and subsequent funding, makes roughly another 2 percent of VMT accessible to the program.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

There are opportunities for Washington's demand management activities to make a more sizable contribution to achieving the goals of Executive Order 07-02. In the short term, focusing on longer commute trips, vanpooling, express bus service, and telework have the greatest potential to yield rapid reductions in VMT and emissions within the present base of employees in the CTR program. The 10 percent of employees who live farthest from their CTR work locations account for 30 percent of the VMT within the program, compared to less than 1 percent of the VMT for the 10 percent of employees who live closest. Shifting the focus to employees who live the farthest from work will require a change in marketing strategy by employers. They will need to identify and focus on their more distant employees, and support for transportation services to

¹ Off-road transportation refers to aviation, marine, and rail transportation emissions.

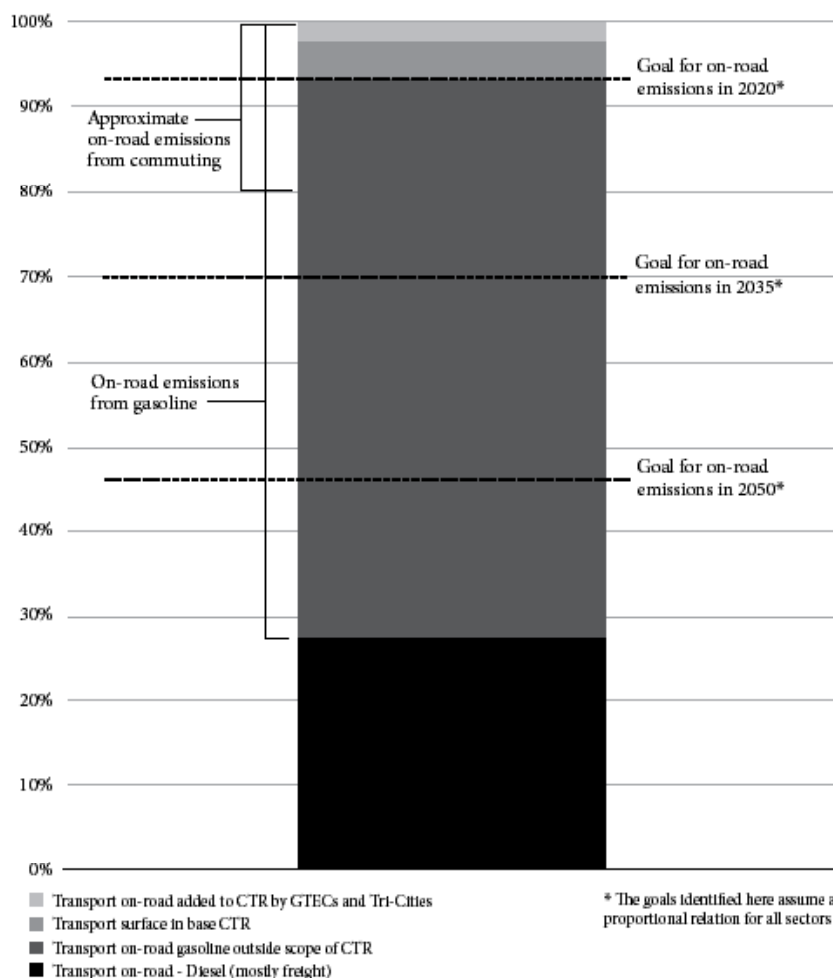
enable these employees to drive less frequently to work.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement)?**

In the longer term, the scope of demand management efforts will need to expand, both working with more than the present 20 percent of the state's commuters, and developing and implementing strategies to enable citizens in reducing their current VMTs on other non-work trips. Trips made for shopping, to get children to and from school, and for some types of recreation are probably the types of trips better suited for effective demand management. Enabling more people to live closer to work, school, and other activities – or closer to convenient transit options – would also help to reduce future demand for travel.

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Percentage of Washington State On-Road Transportation Emissions in 2005





Washington State Department of Transportation

Commute Trip Reduction (CTR) Program

What is the program?

The legislature passed the Commute Trip Reduction (CTR) Law in 1991, incorporating it into the Washington Clean Air Act. The goals of the program are to reduce traffic congestion, air pollution, and petroleum consumption by encouraging employees at the state's largest employment sites to take the bus, vanpool, bicycle, walk, work from home, or use a compressed work week.

Since the law's passage, major employers¹ in the urban areas of the state have implemented commute options programs and demonstrated strong support for the program. The Governor's CTR Board, comprised of representatives from major employers, transit agencies, local governments, regional transportation planning organizations (RTPOs), and state agencies, provides policy oversight and establishes the funding priorities for the program. The Washington State Department of Transportation (WSDOT) distributes program funding and provides policy direction and technical assistance to participating local governments; these local governments work directly with major employers to ensure effective implementation of their programs.

In 2006, the legislature passed the CTR Efficiency Act and made significant changes to the CTR law. These changes focused the program on urban growth areas served by congested highway corridors, introduced a planning role for the state's RTPOs and required local governments to set new goals for reducing drive-alone trips and vehicle miles traveled (VMT). The changes were intended to strengthen the CTR program's tie with the Growth Management Act and local land use and transportation planning.

Approximately 570,000 employees commute to CTR worksites on a daily basis. This is roughly 20 percent of the total number of workers in the state. Commute trips by employees who work at CTR worksites account for 4.6 percent of the statewide VMT.

How does the program help reduce VMT?

The CTR program contributes to emission reductions and has an effect on total transportation demand. While the VMT covered under the CTR program is only a small portion of the state's total VMT, the program's strategies and new policy direction can be a foundation for broader efforts. The CTR planning process provides addresses the transportation and land use connection in local comprehensive planning.

Local governments in the affected urban growth areas of the Central Puget Sound have already set goals to reduce VMT per employee, in line with the Climate Advisory Team recommendations (T-2). The CTR plans can be built upon to develop local, regional, and state VMT reduction goals that are broader than CTR worksites, and the experiences and lessons learned through the CTR planning process can help inform future VMT reduction recommendations.

¹ Major Employers refers to employers with more than 100 full-time employees. Those employees also work throughout the year and are scheduled to arrive at work between 6 a.m. and 9 a.m.

How is the program performing?

The CTR program achieved record results in 2007. The percentage of people who drove alone to work to CTR worksites declined from 70.9 percent in 1993 to 65.5 percent in 2007 (a decrease of more than five percent). Employees make decisions about how to travel to work based on a variety of factors – cost, convenience, distance, time, etc. CTR provides information and incentives for employees to choose alternatives to driving alone. Employees commuting to CTR worksites made nearly 26,000 fewer vehicle trips each weekday morning in 2007 than they did when they entered the program. The absence of these trips has a significant impact on congestion, reducing delay by approximately 18 percent during the peak period on average mornings in the region.

Statewide, employees' round-trip commutes to CTR worksites accounted for just more than 2.4 billion VMT in 2007. Without the changes in employee travel, the commute VMT to these sites would have been 6.7 percent higher – an estimated difference of nearly 170 million miles.

What's happening now?

After the passage of the CTR Efficiency Act in 2006, local governments and RTPOs developed new CTR plans. All of the state's participating cities, counties and regions have set two goals for their affected urban growth areas (in Clark, King, Kitsap, Pierce, Snohomish, Spokane, Thurston, Whatcom, and Yakima counties):

- Reduce the number of drive-alone commute trips to CTR worksites by 10 percent by 2011. Achieving this goal would reduce 27,800 more drive-alone commute trips, nearly doubling the number of trips reduced since the program began.
- Reduce the number of VMT per employee to CTR worksites by 13 percent by 2011.

These goals represent a shift in the CTR program; now, individual employer goals are tied to the goals of the city or county. Local governments have greater flexibility to determine which employers to focus on and which strategies to emphasize to meet their goals. Through the planning process in 2007, they identified potential improvements to local plans, policies and strategies that could support employers and meet their CTR goals.

Local governments and regions are now implementing their plans. Progress toward the goals will be measured in 2009 and 2011. However, local agencies face challenges meeting these goals.

They have:

- large unfunded pedestrian and bicycle safety and mobility needs
- transit service improvement needs
- infill demand needs
- fewer funding sources to help meet these needs and demands

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

Through state agency leadership there are short term opportunities to focus on longer commute trips by using vanpooling, express bus service, and telework to yield rapid reductions in VMT and emissions within the present base of employees in the CTR program. Shifting the focus this way will require a change in marketing strategy by employers, to identify and focus on their

more distant employees, and support for transportation services to enable these employees to drive less frequently to work.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement)?**

Local governments and regions have identified numerous strategies and programs that will help them achieve their goals, including incentives, marketing, and capital investments. Many of the needs identified by cities, counties, and towns are currently underfunded. Additional funding resources would allow for expansion of the CTR program and additional state support through measurement and technical assistance.

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Growth and Transportation Efficiency Center (GTEC) Program

What is the program?

The Commute Trip Reduction (CTR) Efficiency Act of 2006 authorizes local governments to designate employment and residential centers as Growth and Transportation Efficiency Centers (GTECs) and to establish a transportation demand management program in the area (RCW 70.94.528). The program's purpose is to increase the state's transportation system efficiency in areas with high concentrations of jobs and housing, while supporting local goals and policies to direct growth and economic development into urban centers.

What are some of the GTEC program strategies?

GTECs plan for an array of strategies to meet their goals. As part of GTEC development, regional and local agencies are identifying associated changes to the built environment and transit services. Some of the strategies include:

- Capital investments in non-motorized and transit amenities identified in transportation management plans, local comprehensive plans, or the local CTR plan, such as:
 - Signage and travel information
 - Bicycle lanes
 - Sidewalk improvements
- Trip reduction incentives for commuters and/or residents, such as:
 - Incentives for ridesharing, using transit, telecommuting, biking, and walking
 - Transit passes
- Engaging and working with small employers to support:
 - Incentives
 - Employer training
 - Promotions and education
- Policy and funding initiatives:
 - Parking management
 - Multimodal concurrency
 - Investments in increased transit services designed to meet commuter needs

How does the program help reduce vehicle miles traveled (VMT)?

CTR is focused on commute trips, which are between 18 percent and 33 percent of all trips on the transportation system. The GTEC program – when compared to CTR program – expands the proportion of the travel market that is influenced by demand management strategies by:

- working with smaller employers than the CTR program
- working with residents
- addressing other trip purposes, such as trips to school

Each GTEC's drive-alone and VMT per capita reduction goals must be incorporated into local comprehensive plans. The VMT per capita reduction goals established by the GTECs are more aggressive than the CTR goals and support the new VMT per capita reduction goals in statute.

The long-term focus of the GTEC program is to build private and public sector partnerships that integrate land use and transportation decision-making. The GTEC planning process brings together the private sector, transit agencies, local governments and others to implement a common vision of commercial and residential development tied to transportation goals. As growing communities implement successful demand management and transportation-efficient land use policies, there will be improved access to jobs, less demand for new parking, more room for commercial and residential development, and less greenhouse gas emissions.

What's happening now?

In 2007, 14 cities from the central Puget Sound, Vancouver and Spokane urban areas volunteered to develop GTEC plans and applied for funding from the Governor's Commute Trip Reduction Board. The board selected seven GTECs, using the \$2.4 million one-time funding provided by the legislature in the 2007-2009 transportation budget. Three additional cities are implementing their plans without state funding support.

Currently, the state's designated GTECs are:

- | | |
|------------------------------------|------------------------------------|
| ▪ Downtown Seattle | ▪ Tukwila (not funded) |
| ▪ Downtown Bellevue | ▪ Puyallup South Hill (not funded) |
| ▪ Redmond/Overlake | ▪ Downtown Olympia/Capitol campus |
| ▪ Downtown Tacoma | ▪ Downtown Vancouver |
| ▪ Kirkland/Totem Lake (not funded) | ▪ Downtown Spokane |

Each of the GTECs have voluntarily set goals to reduce drive-alone trips and VMT per capita and have identified transportation and land use strategies to meet the goals. These GTECs are presently implementing their plans by establishing baseline measurements, reaching out to target populations, and developing new services and policies. Washington State Department of Transportation (WSDOT) is supporting the ten GTECs with measurement support and technical assistance.

WSDOT estimates that if these ten GTECs were to meet their 2011 goals, about 14,000 drive-alone commute trips to key employment destinations would be reduced. Commute VMT per employee in the GTECs would be reduced by an estimated 13 percent from 2007 levels. In 2009 and 2011 WSDOT will measure the progress of the GTECs toward their goals.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

Current funding supports implementation of GTECs through June 30, 2009.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement?)

The GTEC program is still in its start-up phase and there will be many lessons learned during implementation. Additional resources are needed to provide technical support, data collection and marketing to support GTEC programs, as well as state and regional leadership in land use policies, such as parking management and multimodal concurrency.

The legislature has directed WSDOT to provide a report by 2009 on the initial program and recommendations on future funding levels. WSDOT's preliminary recommendation would fund a total of 18 GTECs (8 new GTECs with funding for these plus the original 10 GTECs) with

50 percent local match for a projected reduction of 14,000 drive-alone trips (above and beyond the CTR program) by 2011.

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Vanpool Investment Program

What is the program?

In 2003, the legislature developed a 10-year, \$30 million transportation plan to expand vanpooling statewide. The funds are designated for public transit agencies and can only be used for the capital costs of placing new vans on the road, or incentives to employers to increase vanpool use. Since 2003, more than \$12 million has been invested to purchase 577 vans for 20 transit agencies. At that time, vanpool operators set a goal of doubling the number of operating vanpools in Washington to a total of 3,180 operating vans by 2013.

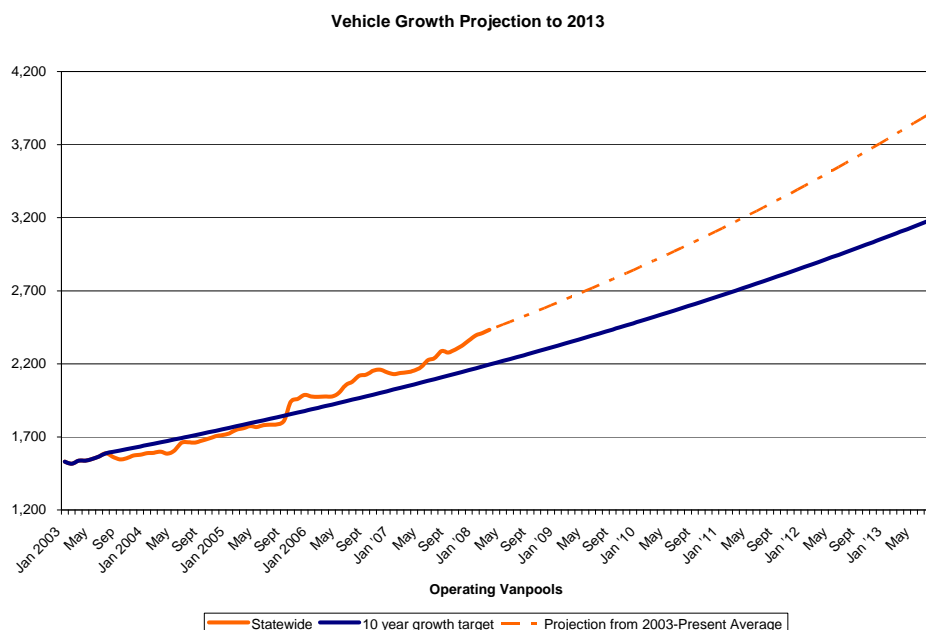
Vanpooling is a key strategy for local and state goals to reduce drive-alone commute trips and vehicle miles traveled (VMT) per capita. It also supports rural economic development by providing an economical choice for commuters to travel long distances to work sites such as the Department of Energy's Hanford site.

How does the program help reduce VMT?

Vanpooling is a crucial approach for reducing VMT per capita. The 10 percent of commuters in the Commute Trip Reduction (CTR) program who live furthest from their work locations account for 30 percent of the VMT in the program, compared to less than one percent for the 10 percent of employees who live closest. This means that shifts from driving alone to vanpooling by even a relatively small segment of the long-distance commuter would have large reductions in VMT per capita. The long-distance commuter market should be a primary emphasis of the state's efforts to reduce commute-related VMT.

What's happening now?

Washington State continues to lead the nation in vanpooling with the largest public vanpool fleet in North America. Vanpools traveled 29.3 million miles in 2007. For the central Puget Sound in 2006, the number of passenger miles traveled in vanpools was 2.8 percent of the peak period VMT. As of January 2008, there



were 2,360 vans operating statewide, at an average passenger count of 8.14, traveling 2,229,300 miles.¹

Between June 2003 and January 2008, the number of vanpools in the state increased 51 percent to 2,360 operating vehicles. Ridership increased 53 percent during the same period. This dramatic growth can be attributed to several factors, including state investment, strong local programs, enhanced collaboration among agencies, and increasing gas prices. A significant portion of these vanpools travel to current CTR worksites.

Due to high commuter demand for vanpooling, the program is growing quickly. If current growth rates are maintained, the program will meet its 2013 goal by February 2011. Even with substantial state investment, transit agencies report waiting lists with formed groups for vanpools. WSDOT will not be able to meet the demand for new vans with the funding remaining in 2007-2009.

The statewide vanpool team is currently developing a new expansion plan and seeks to tie its ridership and van growth goals to the 2020 climate change goals.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

The state is purchasing as many vans as possible with current resources. Local transit agencies operate and maintain the vans. Currently, the program provides vans to transit agencies based on their requests. Because funding is not sufficient to meet demand, WSDOT is developing criteria to prioritize the allocation of vans. For example, prioritization could be based on providing vans to those groups traveling the longest distances, or prioritizing groups for drive-alone commuters over carpoolers.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

WSDOT estimates that the anticipated funding level of \$7 million for the 2009-2011 biennium will not fully meet the demand for new vanpools. Additional resources would allow the transit agencies to continue current growth rates in vanpooling and reduce more VMT per capita. If additional funding was provided to maintain the program growth rates, between 2,700 and 4,100 additional drive-alone a.m. trips per day would be reduced from June 2009 to June 2011.

Current funding is limited to purchasing new vans or providing incentives for employers. If new funds were more flexible, a portion could be used for outreach and education to long distance commuters, technology improvements for improved data collection, and enhanced ridematching systems. These operational enhancements would develop a larger vanpool market and increase the average occupancy of each van.

¹ WSDOT has limited data on the modes vanpool passengers shift from to join a vanpool, but the data available indicates that about 4.6 trips at that average passenger load would be shifting from a drive-alone mode. We therefore estimate that the VMT reduction for the month by vanpool passengers to be about 10.3 million miles for the month. While this figure doesn't directly annualize due to program growth, stretching this figure out for a 12 month period would generate a 124 million mile savings.

The growth of the statewide vanpool program is constrained by transit system demands for other fleet capital replacement or expansion, demands for vanpool capital replacement, limited maintenance base capacity, and fuel costs.

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Trip Reduction Performance Program (TRPP)

What is the program?

The legislature created the Trip Reduction Performance Program (TRPP) in 2003 as a way for the state to fund organizations that implement sustainable, cost-effective projects that increase the capacity of the transportation system by reducing the number of drive-alone trips and vehicle miles traveled (VMT) for commute purposes. TRPP funds are awarded on a competitive basis to entrepreneurs, private employers, public agencies, nonprofit organizations, developers and property managers who provide financial incentives to commuters for using alternatives to driving alone.

The purpose of the program is to create a trip reduction “market” in which the Washington State Department of Transportation (WSDOT) takes “bids” from organizations to reduce commute trips. WSDOT sets a cap on the price it is willing to pay per trip reduced over the course of a year. The program is different from a standard grant program in that the final award for a contractor is dependent on the performance of a project. Contractors are eligible for financial bonuses (up to a cap) if their projects exceed their goals.

The legislature provided \$1.5 million for each of the first two cycles of the program in 2003-2005 and 2005-2007. In each biennium, the program exceeded its trip reduction goals as shown in the table below.

How does the program help reduce VMT?

TRPP offers a mechanism for the state to fund innovative projects to reduce drive-alone commute trips and commute VMT. As WSDOT and the Commute Trip Reduction (CTR) Board evaluate the program, there will be an opportunity to recommend changes, and the program focused specifically on the state’s goals for reducing VMT per capita.

What’s happening now?

The legislature provided \$2.5 million in 2007-2009 for the TRPP. WSDOT awarded the funds in two separate calls for projects. If the program meets its 2007-2009 goals, 6,900 drive-alone trips will be reduced daily; many of these trips will be to CTR worksites. Results will be measured by June 2009 and final payments will be made based on project performance.

Trip Reduction Performance Program			
	Estimated Trips Reduced	Actual Trips Reduced	Amount per Trip
2003 - 2005	3,427	5,150	\$243
2005 - 2007	3,906	4,379	\$234
2007 - 2009			
Round One	4,271	-	\$321*
2007 - 2009			
Round Two	2,668	-	\$375*

* Proposed amount - final amount per trip will depend upon results

WSDOT is currently evaluating the TRPP model to see how it can be improved based on the experiences of two completed funding cycles. WSDOT will also be working with

the CTR Board to determine the effectiveness of the program compared to the Rideshare Tax Credit, which offers credits in the business and occupation tax to employers that subsidize or offer incentives to their employees to use alternatives to drive-alone commuting. The Tax Credit program is funded at \$5.5 million per biennium. The legislature has directed the CTR Board to make recommendations about the effectiveness of the two programs and if funding should be shifted between them.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

WSDOT is evaluating the program and considering how TRPP can be more effective. Part of this evaluation is determining ways the program can focus on VMT.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement?)**

In its evaluation of TRPP, WSDOT is considering several policy options, including:

- Shifting the focus from drive-alone commute trips to all trips, or to all trips in the peak period
- Shifting the bids and performance payments from drive-alone trips reduced to VMT reduced
- Shifting the focus to specific corridors where the need for trip reduction is greatest
- Whether TRPP can be used to supplement programs at CTR worksites or within Growth and Transportation Efficiency Centers (GTECs) as it does currently, or whether it should be focused on commuters that are not already exposed to these programs
- Dedicating a portion of the funds to innovative projects that may not perform well, but will advance the state of the practice, while awarding the rest of the funds for more proven strategies based on performance

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Park and Ride Program

What is the program?

The Washington State Department of Transportation (WSDOT) is currently developing a formal park and ride program. Limited capacity at park and ride lots is constraining the efficiency of the transportation system. A state role is critical in developing financial partnerships to expand capacity and maintain a safe and reliable park and ride system.

How does the program help reduce vehicle miles traveled (VMT)?

The park and ride system is a crucial piece of infrastructure in providing transportation choices. Park and ride lots provide the location where commuters transfer from single occupancy vehicles to carpools, vanpools and transit, thus each parked vehicle represents some amount of reduced vehicle miles traveled. Overcrowded lots indicate there is unmet demand. At occupancy levels above 70 percent, the risk of not finding a parking space becomes an issue for potential users and discourages expanded use of ridesharing and transit.

The most crowded lots are located along the most congested corridors including I-5, I-405, State Route 520, and I-90. Many of the park and rides are full throughout Puget Sound, Clark County, and Spokane.

Park and ride demand and the development of new park and ride capacity are critical to implementation of transportation demand strategies and vital for increasing transit market share. Efforts to promote transit and ridesharing are hampered by insufficient capacity at many commuter park and ride facilities.

What is happening now (current status/activities)?

There is no dedicated state funding for park and rides. Park and ride lots in Washington are built, owned, and operated by transit and governmental agencies. Washington's park and ride network has developed incrementally based on partnership opportunities, funding availability, and need. By the end of 2000, there were roughly 350 park and ride lots in Washington offering more than 45,000 parking spaces.

WSDOT is developing a comprehensive statewide park and ride program to plan, coordinate, develop, and implement partnerships for park and ride facilities. WSDOT intends to update the statewide park and ride inventory, establish an investment policy, and develop a needs assessment for the park and ride system by December, 2008.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

The Regional Mobility Grant program has contributed funding for the park and ride program in the past. The Regional Mobility Grant program could amend the funding criteria to prioritize VMT reduction.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement)?**

WSDOT is developing short-term strategies for improving the park and ride system, such as leasing lots (from churches, grocery stores, and other parking suppliers), adding safety and security amenities to boost utilization of unpopular lots, and providing enhanced traveler information so that commuters know before they arrive at a lot whether there are spaces available.

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Construction Traffic Management Program

What is the program?

The Washington State Department of Transportation's (WSDOT's) Construction Traffic Management program includes a variety of strategies to help keep people and traffic moving during construction. Nationally, 10 percent of traffic congestion is due to construction. With an unprecedented highway construction program and a growing population, this percentage is likely to be notably higher in Washington State. We must intensify these strategies, improve efficiency and manage demand to keep people and goods moving while delivering an unprecedented amount of construction.

How does the program help reduce vehicle miles traveled (VMT)?

The Construction Traffic Management program helps reduce VMT by:

- Allowing us to develop demand management partnerships and implement demand management projects and programs targeted to key construction projects, schedules and corridors
- Through construction closures providing a compelling reason for drivers and employers to sample efficient travel alternatives like carpools, transit, vanpools, walking, teleworking, bicycling, variable work schedules and incorporate them into their daily lives. Construction mitigation projects and programs provide capacity and access to these alternatives so they are viable during construction
- Many capital and operating investments tied to construction management will have utility beyond construction
- Allowing us to test and measure performance of demand management projects and services

What is happening now (current status/activities)?

Pilot programs to reduce demand on affected highways are underway on the Eastside of Lake Washington to support I-405 construction and will begin in the Seattle area next year to support Alaskan Way Viaduct construction south of the stadiums. Performance measurement results will help inform future demand management decisions. WSDOT is also:

- Conducting more advance construction schedule planning and analysis, which sets the stage for more robust traffic management and mitigation efforts
- Developing new systems to track construction schedules and analyze their likely impact on traffic
- Working with transportation demand management implementation partners to engage them in advance to plan for traffic impacts due to construction

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

To enhance the Construction Traffic Management program's ability to reduce VMT, WSDOT can:

- Continue to enlist local and regional partners to collaborate
- Incorporate construction traffic management as criteria for grant programs
- Develop mitigation projects and services that support multiple construction projects
- Develop technology to streamline construction and TDM coordination, analysis and measurement
- Expedite traveler information system improvement
- Share information about performance of mitigation efforts
- Incorporate mitigation planning and funding into early phases of project development, including programming, planning and design

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

Additional funding and staff resources would allow WSDOT to:

- Test concepts and measure their performance related to VMT reduction and system efficiency during construction
- Systemwide and targeted mitigation implementation projects and services
- Provide support construction tracking, analysis and performance measurement
- Ensure that implementation partners like transit agencies, local jurisdictions, businesses, non-governmental organizations and other WSDOT programs, have the capacity to accommodate additional demand for travel alternatives
- Improve traveler information

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Regional Mobility Grant Program

What is the program?

The Regional Mobility Grant program provides funds to local governments to improve inter-county transit services, park and ride lots, rush hour transit service and capital projects that improve transportation system connections and efficiency. The program is designed to improve the coordination of transit services and to increase the use of transit to reduce congestion on our most heavily traveled highways.

The program helps local governments by funding projects such as:

- Inter-county connections between transit agencies
- Park and ride lots
- Rush hour transit service on congested roadways
- Projects that reduce delay for people and goods

How does the program help reduce vehicle miles traveled (VMT)?

The program provides support for service and capital improvements to make transportation alternatives more viable and appealing. This program leverages local and federal funds.

What is happening now (current status/activities)?

This competitive grant program provides \$40 million per biennium in state dollars to support projects and service. We are starting our third grant cycle for the 2009-2011 biennium. We are tracking project delivery and are beginning to track performance of completed projects.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

- Track and report performance of completed projects and use the information to influence future decision-making; and
- Retain VMT reduction as one of the competitive selection criteria.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

- Expand amount of money available for grants;
- Provide additional funds and staff to enhance performance measurement; and
- Provide additional funds and staff to support additional analysis during grant selection process.

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Kitsap Telework Pilot Project (Proposed Program)

What is the program?

The legislature provided \$150,000 in 2007-2009 for the Kitsap Telework Pilot Project. The primary purposes of the pilot project are to educate employers about teleworking; develop telework policies and resources for employers; and reduce traffic congestion by encouraging teleworking in the workplace. The Kitsap Regional Coordinating Council is implementing the pilot project. The council will recruit public and private sector employer participants throughout the county, identify telework sites, develop an employer's toolkit, and create a teleworking template that may be used in other communities. WSDOT is administering the state funds and providing technical assistance to support the project.

How does the program help reduce vehicle miles traveled (VMT)?

Telework reduces commute VMT because teleworkers work at home or at a telework center that is closer to home than the workplace. A successful pilot project could lead to a reduction in commute vehicle miles traveled for many Kitsap peninsula residents.

What is happening now (current status/activities)?

project is in the start-up phase as of May 30, 2008. The Kitsap Regional Coordinating Council is gathering existing materials and best practices and beginning to reach out to employers. The council is required to submit a summary of the program results and recommendations for future telework strategies to the legislature by July 1, 2009.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

This is a pilot project and the scope has fully utilized existing resources. The lessons learned and recommendations from the pilot can help guide future investments and policies for telework and VMT reduction.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

Additional resources could be distributed as grants to organizations that seek to introduce or expand teleworking in the state. Tax credits could be provided for organizations that provide incentives for telework or have measured reductions in VMT from teleworking. The lessons learned and recommendations from the pilot can help guide future investments and policies for telework.

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Transportation Demand Management Strategies for Schools Study

What is the study?

In 2007, the Washington State Legislature asked the Washington State Department of Transportation (WSDOT) to conduct a study, develop strategies and make recommendations to reduce auto congestion around schools. The legislature is interested in finding ways to effectively address congestion associated with high traffic flow created by students and parents commuting to school. In the case of elementary and junior high schools, parents driving their children to school can create high traffic flows in surrounding neighborhoods. High schools and universities generate congestion from students driving themselves.

WSDOT's Safe Routes to Schools program provides technical assistance and resources to cities, counties, schools, school districts and state agencies for engineering, education, encouragement and enforcement, improvements that will get more children walking and bicycling to school safely. The Safe Routes to Schools program is the primary state grant program to address trips to kindergarten through 8th grade schools.

This transportation demand management strategies for schools study is looking at other opportunities to address trips to school (kindergarten through 12th grade (K-12) and colleges universities). The study's recommendations are due to the legislature by January 2009.

How does the study help reduce VMT?

Schools represent a significant generator of trips, and communities can benefit from reducing traffic impact on surrounding roads. Considerable number of vehicle trips is generated by taking students to school. Educating students and parents about alternative modes of transportation can have major long term effects on the reduction of drive-alone vehicle trips. Reducing the emissions associated with vehicle trips further fits with the overarching goals of the Governor's Climate Change Challenge. The strategies for schools study will help determine the potential for inclusion in Washington's Commute Trip Reduction (CTR program).

What is happening now (current status/activities)?

WSDOT has divided the study into two phases. To help guide the study, WSDOT assembled an advisory group of various experts on schools and school transportation issues. The advisory group helped the study team focus on the most significant issues affecting travel to school and suggested potential models for study.

Phase 1 of the study included a literature review summarizing the level of knowledge about the subject and helps to identify models and strategies. The models that were identified guided the statewide search for potential programs of interest to examine and learn from in Phase 2. These programs of interest include:

- Safe Routes to Schools in urban and small city elementary schools
- The use of fare-free transit
- An introduction of mobility education curriculum in high schools
- A mandatory universal pass program at a university
- A ride sharing Web site
- The inclusion of a school in a growth and transportation efficiency center under the state's CTR law

What can we be doing with existing resources to enhance the study's ability to reduce VMT?

Legislative direction has focused the study on relieving congestion around schools. Recommendations from the study are due to the legislature by January 2009.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement)?**

Additional funding would provide expansion of the study to a program based on the final study results.

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The High Occupancy Vehicle Program

What is the program?

The High Occupancy Vehicle (HOV) system is a network of freeway lanes in the Puget Sound area that are for use by high occupancy vehicles such as transit, vanpools, and carpools.

Approximately half of the lanes operate as HOV-only around the clock, and the other half are open to all traffic at night (after 7:00 pm).

The system includes direct access ramps, which allow HOVs to enter and exit HOV lanes when the HOV lane is situated on the far left side of the freeway next to the center median. Direct access to the left-side HOV lanes allows HOVs to bypass metered on-ramps and eliminates the potentially dangerous and traffic delaying weave across other freeway lanes.

In May of 2008 the HOV lanes on SR 167 were converted to high occupancy/toll or HOT lanes. When there is extra space in the HOT lane, solo drivers can pay an electronic toll using a interior car-mounted transponder for a faster, more reliable trip. Toll rates increase and decrease with the level of congestion to ensure that traffic in the HOT lane always flows freely and carpools, vanpools and transit enjoy the same reliable trip they have in HOV lanes.

The HOV system increases freeway efficiency by moving more people in fewer vehicles and by providing an additional incentive to rideshare.

The goals of the HOV system are:

- To maximize the people-carrying capacity of the freeway system by providing an incentive to use buses, vanpools and carpools.
- To provide capacity for future travel growth.
- To help reduce transportation-related pollution and dependency on fossil fuels.

HOV and transit-only lanes also exist on some arterials. These generally fall under the jurisdiction of the local municipality and are not included in this description.

How does the program help reduce VMT?

HOV lanes support carpool, transit, and vanpool traveltime savings and reliability. They have also been shown to encourage mode shift from single occupant vehicles to shared ride modes. The main reasons cited for using shared rides in the HOV lanes are travel time, convenience, saving money, and less stress.

Survey data indicates that 99 percent of system users have at least one working vehicle at home. This indicates the HOV system is succeeding in shifting people from single occupancy vehicle (SOV) to shared ride modes. HOV system mode split in 2006 was 65 percent carpools, 20 percent transit, and 4 percent vanpools. The majority of HOV system users are two-person adult carpoolers.

The current system is moving about 34 percent of peak period freeway travelers in only 19 percent of overall freeway vehicles traveling in the peak directions. Approximately 200,000 one-way trips are made on the freeway HOV system on an average weekday.

What is happening now (current status/activities)?

The first freeway HOV segment opened almost 40 years ago. Approximately 235 lane-miles of a planned 310 mile system are currently operating. Seven direct access ramps out of a planned 20 have been built.

Projects totaling another 10 lane-miles and three direct access ramps are currently under construction. Another 15 miles of funded projects and one direct access ramp have not broken ground. Funding is still required to complete the remaining 50 miles of the system and nine direct access ramps. Existing, funded, and unfunded parts of the system are shown in the map to the right.



What can we be doing with existing resources to enhance the program's ability to reduce VMT?

Freeway HOV lanes are currently congested on I-5 and I-405 during the peak periods in the peak directions. Congested HOV lanes reduce the travel time and reliability benefits of shared ride modes and thus reduce HOV lane's effectiveness in shifting demand to HOV modes. However, raising the vehicle occupancy requirement from two or more people (2+) to three or more people (3+) would push two-person carpools into already congested general purpose lanes and diminish the incentive for two people to carpool. The loss of incentive to carpool in the general purpose lanes would probably result in a shift back to single occupant vehicles and increase total VMT.

Though the I-5 and I-405 HOV lanes have little ability to accommodate additional vehicular traffic during peak periods, there is considerable additional person-carrying capacity in the vehicles that use the HOV lanes. This suggests there may still be potential for targeted transportation demand management (TDM) programs to reduce VMT by shifting SOV travel to HOV modes. Other approaches to managing HOV system capacity are being developed, some of which could be relatively inexpensive.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

- A study is being finalized which looks at both short and long-term treatments for easing congestion in the I-5 HOV lanes. This was a low-cost fast-track study which could be expanded to look at other parts of the system, in conjunction with other planning and studies, to address short-term issues. The study could be expanded to look at certain locations and applications in more depth where required.
- Completion of the HOV system (SR 16 northeast to Purdy, I-5 south to Lakewood, and SR 167 down to Puyallup and back up to Fife at the I-5/SR 167 interchange) as shown on the map is not fully funded. The remaining nine direct access ramps are also unfunded. Direct access ramps have been largely funded by Sound Transit.
- Beyond completion of the currently planned HOV system, further expansion in the Puget Sound and other metropolitan areas of the state could be studied in conjunction with tolling and other congestion management plans. Expansion of arterial HOV, transit-only and BAT (**b**usiness **a**ccess and **t**ransit) lanes could also be performed in conjunction with the appropriate municipalities.

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Tolling and Pricing Program

What is the program?

The Washington State Department of Transportation (WSDOT) has initiated tolling on the State Route (SR) 16 Tacoma Narrows Bridge, and on the High Occupancy Toll (HOT) lanes pilot project on SR 167. We are also planning for tolls to help finance replacement of the SR 520 Evergreen Point Bridge. In partnership with the Puget Sound Regional Council (PSRC) and others we are examining additional uses of tolling to raise transportation revenues and manage congestion.

How does the program help reduce vehicle miles traveled (VMT)?

In theory, if drivers become more aware of the cost of each trip through paying a toll, they will – when they have a choice – conserve travel by:

- making fewer and shorter trips,
- telecommuting,
- using transit, vanpools or carpools,
- walking or bicycling.

Different approaches to tolling may have different impacts on VMT. Through practical experience and improved analysis tools we will be better equipped to predict VMT document reductions

What is happening now (current status/activities)?

Some of the current tolling activities we are working on include:

- Tolling the Tacoma Narrows bridge
- Conducting a pilot project to test and evaluate HOT lane implementation on SR 167
- Received a federal Urban Partnership grant to accelerate implementation of tolling on SR 520 prior to bridge reconstruction in partnership with King County and the Puget Sound Regional Council. This project will also provide documentation of the effect of tolls on travel behavior.
- Conducting public outreach during the Summer of 2008 on toll concepts to fund SR 520 bridge replacement.
- Working with PSRC to develop tolling options to include an update to the Metropolitan Transportation Plan (MTP).
- Express toll lanes, with two express lanes per direction, are being evaluated for I-405.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

Implementation and expansion of tolling will require:

- Regional agreement on tolling policies and strategies
- Public outreach and acceptance
- Positive results from initial tolling efforts.

In the short term without new funding we could be developing tolling, high occupancy vehicle (HOV) and traffic management policies to guide future tolling projects.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement)?**

Based on the results of our current pilot high occupancy toll (HOT) lanes project we will assess potential for future applications.

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Active Community Environments Initiative

What is the program?

The Center for Disease Control's five year partnership project with Washington State Department of Health and Washington State Department of Transportation, called *the Active Community Environments Initiative*, promotes walking, bicycling, and the development of accessible recreation facilities. It was developed in response to data from a variety of disciplines, including public health, urban design, and transportation planning. These data suggest characteristics of our communities such as proximity of facilities, street design, density of housing, and the availability of public transit, pedestrian and bicycle facilities play a significant role in promoting or discouraging physical activity.

This initiative encourages environmental and policy interventions that will affect increased levels of physical activity and improved public health. The goals are to:

- encourage the development of pedestrian and bicycle friendly environments
- promote active forms of transportation like walking and bicycling
- disseminate information and technical resources related to Active Community Environments Initiative

How does the program help reduce vehicle miles traveled (VMT)?

In Washington State, over half of all trips are under three miles, yet 80 percent of these trips are made by car.¹ Part of the earliest and most effective areas on which to focus for reducing VMT and related emissions is lowering the number of short vehicle trips – especially focusing on urban and urbanizing areas. Most people drive for short trips because, in many places, the built environment makes walking and biking either uninviting or very difficult.

Biking and walking are increasing in Washington, particularly in urban and urbanizing areas where housing infill is occurring. Bicycle commuting has increased 75 percent in the past ten years.² Biking and walking currently account for about 6 percent of statewide commute trips.³ In the Puget Sound Region, bicycling and walking account for 9 percent of all trips.⁴ In several urban core areas across Washington, bicycling and walking account for 15 percent of all trips.⁵ Bicycle touring has also become increasingly popular and contributes more than \$6 million annually to local economies in the state.⁶

What is happening now (current status/activities)?

Current statewide activities to promote the goals of the Active Community Environments Initiative include:

- develop the Kids Walk-to-School program to promote walking and bicycling to school.
- collaborate with public and private agencies to promote Walk-to-School Day.

¹ National Household Travel Survey (NHTS), www.bts.gov/programs/national_household_travel_survey/.

² US Census, www.census.gov/.

³ NHTS; US Census;

Regional Household Activity Survey Analysis Report, PSRC (2006)). www.psrc.org/data/surveys/hhsurvey/index.htm.

⁴ Regional Household Activity Survey Analysis Report, PSRC (2006)). www.psrc.org/data/surveys/hhsurvey/index.htm.

⁵ Ibid.

⁶ Bicycle Alliance of Washington, www.bicyclealliance.org/.

- develop the Active Community Environments guidebook for public health practitioners to use to partner with transportation and city planning organizations to promote walking, bicycling, and close to home recreation facilities.
- promote the development and use of close-to-home parks and recreational facilities through a partnership with the National Park Services Rivers, Trails, and Conservation Assistance Program.
- collaborate on the King County HealthScape study to review the relationships of land use, transportation, air quality, and physical activity.
- collaborate with the Environmental Protection Agency on a national survey to study attitudes of the American public toward the environment, walking, and bicycling.

Additionally, Regional Transportation Planning Organizations across the state have joined the Active Community Environments Initiative and are benchmarking their efforts to connect bicycle and pedestrian facilities and improve safety using a Community Assessment survey developed by the statewide team.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

Funding to continue the efforts of this program beyond this year is uncertain. However, the Center for Disease Control has named this program one of the top ten initiatives of the year.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

Additional funding would fund Community Assessment surveys at additional locations to be administered by Regional Transportation Planning Organizations and expand WSDOT and DOH technical assistance services.

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Bicycle and Pedestrian Program

What is the program?

The Bicycle and Pedestrian program provides technical assistance and resources to improve conditions for bicycling and walking and promote partnerships between WSDOT, local agencies, school districts, tribal nations and stakeholder groups.

In 2005, the Washington State Legislature committed \$74 million to support pedestrian and bicycle safety projects such as pedestrian and bicycle paths, sidewalks, safe routes to school and transit. The Bicycle and Pedestrian program administers this funding program. To date, grants have been awarded to more than 100 projects that help reduce the over 400 annual fatal and injury crashes involving bicycles and pedestrians and improve conditions for biking and walking across the state.

The Bicycle and Pedestrian program offers assistance and resources to project offices, traffic engineers, communicators, designers and planners in several specialty areas including:

- Improving pedestrian and bicycle safety and mobility,
- School zone and walk route design,
- Trail and path design, and
- Design for access/universal design

How does the program help reduce vehicle miles traveled (VMT)?

In Washington State, more than half of all trips are under three miles, yet 80 percent of these trips are made by car.¹ One of the most cost effective focus areas for reducing VMT and related emissions is lowering the number of short vehicle trips. Most people drive for short trips because, in many places, the built environment makes walking and biking either uninviting or difficult.

Biking and walking are increasing in Washington, particularly in urban and urbanizing areas where housing infill is occurring. Bicycle commuting has increased 75 percent in the past ten years.² Biking and walking currently account for about 6 percent of statewide commute trips.³ In the Puget Sound Region, bicycling and walking account for 9 percent of all trips.⁴ In several urban core areas across Washington, bicycling and walking account for 15 percent of all trips.⁵

"In preparation for a two year pilot study of the potential impacts of bicycle/pedestrian transportation, Federal Highway Administration (FHWA) conducted baseline travel surveys in four pilot and one control community. They found that bicycling and walking trips currently substitute for an estimated 156.1 million VMT annually in the four pilot communities.⁶ A second

¹ National Household Travel Survey (NHTS), www.bts.gov/programs/national_household_travel_survey/.

² US Census, www.census.gov/.

³ NHTS; US Census;

Regional Household Activity Survey Analysis Report, PSRC (2006)). www.psrc.org/data/surveys/hhsurvey/index.htm.

⁴ Regional Household Activity Survey Analysis Report, PSRC (2006)). www.psrc.org/data/surveys/hhsurvey/index.htm

⁵ Ibid.

⁶ FHWA Interim Report to the U.S. Congress on the Non-motorized Transportation Pilot Program SAFETEA-LU Section 1807, November 2007.

phase of the FHWA study focusing on impacts of specific bicycle and pedestrian improvement projects is due to be completed in 2010, with preliminary findings available this year.

What is happening now (current status/activities)?

The recent update of the State's Bicycle and Pedestrian Plan found that cities, counties and ports in Washington have identified more than \$1.2 billion in unmet pedestrian and bicycle improvement needs. This year WSDOT received 93 applications from cities, counties and schools for bicycle and pedestrian projects totaling \$36 million and expects to be able to provide \$7 million in funding to meet a portion of these needs.

Bicycle and Pedestrian program has also developed a partnership with the Department of Health and regional transportation planning organizations using funds secured through the Center for Disease Control (CDC). This partnership project, called *Active Community Environments Initiative*⁷, aims to improve the health and quality of life for Washington's citizens by improving and increasing opportunities to bicycle and walk.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

As outlined in the State Bicycle and Pedestrian Plan, the effectiveness of the Bicycle and Pedestrian program could be increased by:

- Additional benchmarking and tracking performance statewide including the development of a user count database.
- Expanding resources and technical assistance provided through the Bicycle and Pedestrian program.
- Requiring bicycle and pedestrian design and funding training for agency staff, particularly as part of new engineers' training.
- Considering bicycle and pedestrian needs in all planning and corridor studies.
- Revising the scoping process to include more definition for bicycle and pedestrian components and increased coordination with local agencies and transit providers.

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

With gas prices rising and housing infill projects increasing across the state, there is an increasing demand for the services and resources of the Bicycle and Pedestrian program.

In addition to meeting increased demand for services, there is an immediate opportunity for bicycle and pedestrian infrastructure investments (i.e., trails, sidewalks) to be included as part of a WSDOT programmatic environmental strategy.⁸ WSDOT's work with DOH conduct new

⁷ See WSDOT's Active Community Environments Initiative briefing paper for more detail. The briefing paper is located on the Transportation Implementation Working Group (IWG) web page: www.ecy.wa.gov/climatechange/2008CATdocs/IWG/tran/060908_tran_ActiveCommunityEnviroInitiative.pdf

⁸ **NOTE:** A recent study conducted by the Bay Area Air Quality Management District has taken the next step in estimating impacts of new trails and bike lanes on VMT and CO₂. This study found, based an evaluation of many types of projects ranging from rideshare programs to vanpooling to traffic operations improvements, that trails and bike lanes are one of the most cost effective investments in terms of VMT and CO₂ reduction (an average cost of \$340 per ton of CO₂ eliminated)." ICF Consulting, Performance Review of Selected TFCA Project Types Final Report, Prepared for the Bay Area Air Quality Management District, August 1, 2006.

research on the impacts of biking and walking on air and water quality and public health is currently unfunded and additional resources would enable this work to continue.

Additional resources are also needed immediately to improve regional travel demand models and their ability to consider bicycle and pedestrian improvements or develop new modeling tools that more accurately weigh the costs and benefits of all types of transportation investments, more accurately capture the amount of bicycling and walking and the impacts of bicycle and pedestrian investments.

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Context Sensitive Solutions

What is the program?

Context Sensitive Solutions (CSS) was originally a Federal Highway Administration initiative to “promote transportation solutions that enhance communities and protect the natural and built environment.” Its essence is that a proposed transportation project must be planned and designed not only for its physical aspects as a facility serving specific transportation objectives, but also for its effects on the aesthetic, social, economic and environmental values, needs, constraints and opportunities to fit into its setting.

How does the program help reduce vehicle miles traveled (VMT)?

Transportation design is more of a process than a product. The CSS process produces a result that is visible on streets and roads. It is what people and communities see and experience, whether it is a Main Street or a scenic rural road. CSS is creating new approaches to the flexible application of design controls and standards and more attention to all modes of transportation, including pedestrians, bicyclists, freight mobility and transit. A transportation facility that provides for and promotes walking, biking, taking transit or improves freight mobility, will likely result in significant reductions in vehicle miles traveled.

What is happening now (current status/activities)?

The Washington State Department of Transportation (WSDOT) is guided by a statewide vision for transportation and livable communities, which is part of the Washington Transportation Plan, “Washington’s transportation system should serve our citizens’ safety and mobility, the state’s economic productivity, our communities’ livability and our ecosystem’s viability.” To support this vision, WSDOT is integrating a CSS approach to doing business agency-wide.

WSDOT encourages its employees to look beyond basic transportation issues and develop projects that are integrated with unique contexts within a project setting. WSDOT’s Executive Order on CSS drives this approach at all levels in the organization from Executive to technical staff in all aspects of work. The Executive Order provides the foundation and the case for change for the agency. It recognizes that the consensus or informed consent generated through development of CSS can benefit all parties and may help avoid delay and other costly obstacles to project implementation.

To support integration of CSS, WSDOT has developed guidance documents, outlining processes for working with stakeholder groups, providing an overview of what CSS is, and a resource for balancing flexibility in transportation design. WSDOT has also implemented training in CSS processes for transportation system designers.

The strength and viability of WSDOT’s award winning CSS approach is ensured through its numerous informal and formal partnerships. The agency commitment to CSS is further demonstrated by a strong support for staff development of CSS skills, internal and external

Another current effort to reduce congestion centers on retiming of WSDOT owned and operated traffic signals. WSDOT Signal Operations tracks and reviews the performance of around 885 signals owned and operated by WSDOT statewide. This translates to an estimate of more than 22 million vehicles traveling through WSDOT signals on a daily basis. Careful coordination of signals contributes to a significant aggregated reduction in traffic delay.

HOV Lanes – Approximately 220 miles of a planned 300 mile HOV system are now complete and another 10 lane miles are under construction. HOV lanes move over one-third of the people on rush hour highways using only 19 percent of the vehicles, making them an effective tool in reducing congestion and VMT.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

Additional funding and Full Time Employees (FTE's) for Signal Retiming will allow the Region Traffic Offices to improve traffic signal operations, improve vehicle travel time and reduce traffic delay and green house gas emissions. A recent state audit cited that even a modest level of signal coordination in the Puget Sound could reduce delays by 15 to 20 percent. This equates to an estimated annual savings of \$300 to \$400 million in travel time and vehicle operating costs. Also, annually, for each second of average delay reduction, more than 12,000 metric tons of Carbon Dioxide Equivalent can be prevented from entering into the atmosphere.

**What could we (or should we) be doing with additional resources?
(i.e. where are the opportunities for growth/enhancement)?**

WSDOT is currently studying Active Traffic Management techniques being used successfully in other countries to improve traffic flow and increase safety. Techniques under consideration are: speed harmonization, overhead gantries employing variable speed limits, queue warning, hard shoulder running, dynamic rerouting, travel time signing and junction control.

ATM strategies hold the greatest promise in reducing congestion, traveler delay and greenhouse gases from vehicles stuck in traffic. Additional funding will allow quicker implementation of proven ATM functions.

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Advanced Traffic Operations

What is the program?

The primary objective of Advanced Traffic Operations is to fully utilize the existing highway system while ensuring the safety of system users and reducing congestion. Regulatory measures, traffic control devices and innovative operational techniques are used to maximize the capacity of the system. Traffic Operations also provide services and information that travelers need to safely and efficiently use the transportation system. A more efficiently run system means fewer stopped vehicles idling in traffic, and fewer greenhouse gas emissions being released into the atmosphere.

Currently, Traffic Operations focuses its congestion reduction efforts in the Puget Sound urban core using ramp meters, reversible lanes, traffic data sensors, real time traffic information, High Occupancy Vehicle (HOV) lanes, Incident Response Vehicles, and traffic cameras. Intelligent Transportation System (ITS) devices are essential for communicating traffic and weather conditions to the public, managing traffic flow, collecting traffic data and other functions.

The Washington State Department of Transportation (WSDOT) is in the early stages of implementing High Occupancy Toll (HOT) Lanes and variable tolling. HOV lanes and variable tolling are strategies that can help reduce VMT.

Active Traffic Management (ATM) techniques like variable speed limits, additional travel time displays and other dynamic traffic controls are planned to help reduce congestion on Puget Sound highways.

How does the program help reduce VMT?

According to the American Association of State Highway and Transportation Officials (AASHTO)'s *Primer on Transportation and Climate Change*, management of traffic flow by traffic operations programs in transportation agencies is one of four major factors that affect levels of greenhouse gas emissions. WSDOT agrees with the leaders of many transportation agencies that believe reducing traffic congestion can make a significant contribution to reducing greenhouse gas emissions, and has instituted policies that support congestion reduction. It has been documented that the significant amounts of wasted fuel burned by vehicles stuck in traffic is reduced and fuel consumption is optimized by vehicles traveling at consistent speeds.

What is happening now (current status/activities)?

One highly successful technique for reducing congestion is the Incident Response (IR) Program. Over 50 percent of all congestion on urban highways is caused by non-recurring incidents, like collisions, disabled vehicles, spills or other incidents that impede traffic flow. This can result in four to ten minutes of accrued traffic back up for every minute a lane remains blocked. IR responds to approximately 12,000 incidents each month effecting a sizeable reduction in incident clearance time.

communication of the agency's CSS approach, and a rigorous, agency-wide performance measurement program.

What can we be doing with existing resources to enhance the program's ability to reduce VMT?

WSDOT has taken significant steps to integrate CSS into all facets of the agency's business from the executive level to technical staff, and from early planning through delivery and operation.

WSDOT, guided by an Executive Order and a rigorous accountability process, is identifying new ways to move CSS forward each day. Some areas of current focus include:

- Continue efforts to implement CSS processes as WSDOT's only method for project delivery.
- Establishing processes to ensure consistency between WSDOT projects, local comprehensive plans and regional plans.
- Developing accountability and performance measurement tools that link CSS processes to project development and delivery.
- Continuing to take steps to foster an ecosystem approach to planning, developing and operating the transportation system.
- Continuing to conduct research to address some of the outstanding questions related to flexibility in design (e.g, state highways as main streets, urban street and rural road design, balancing safety and aesthetics).

What could we (or should we) be doing with additional resources? (i.e. where are the opportunities for growth/enhancement)?

Increased funding and integration with land use density practices can help create transportation designs that are sensitive to the environment and reduce VMT.

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